FLIGHT

First Aero Weekly in the World.

Founder and Editor : STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

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EDITORIAL COMMENT.

Airships for Somaliland.

It is no longer a secret that the military and naval authorities have practically decided to employ aircraft in connection with the expedition which it was known in inside circles would be directed against the Somaliland Mullah in the autumn of the present year. Two officers of the Naval Wing, Lieut.-Commander Boothby and Lieut. R. H. Davies, have been at Berbera studying the country and conditions with a view to reporting upon the possibilities of using aircraft, and particularly airships in the interior.

Contrary to a good deal that has been written regarding the possibilities, it will be somewhat surprising if the report of the two officers named does not turn out to be in favour of the enterprise. A great point has been made of the exceedingly high temperatures which rule during the day—as high as 120 F. in the shade has been mentioned—which, in combination with a heavy fall at night would, for reasons thoroughly well understood by our readers, render the use of craft of the "gas-bag" type exceedingly difficult, if not altogether out of the question. True, the summer temperatures sometimes range high, but in the winter it seldom goes above 90 F. in the shade, which is well inside those at which the Italians found it perfectly practicable to use airships in Tripoli. The main difficulties to be encountered are those connected with the transport of supplies of hydrogen into the interior where the Mullah has his base. These are matters on which it is impossible for us to express an opinion—they are questions for the authorities to decide on the merits of the report that will be rendered to them by the two officers charged with their investigation.

Whatever may eventually happen and whether it is after all decided to send aircraft to co-operate with the projected expedition, the fact that Commander Boothby and Lieut. Davies have been sent out at all is sufficiently interesting, for the reason that it marks the first occasion on which it has been seriously proposed to use airships and aeroplanes to co-operate with a British field force.

From many points of view it is to be hoped that the report will be in favour of their use. At present, it cannot be said that aircraft have proved conspicuously successful in actual war. For one thing, their use is something altogether too new for there to have been time to get a true line through their capabilities. For another, no nation is anxious to give away the fruits of its experience for the benefit of possible enemies, so that the only reliable methods of obtaining information are those of a first hand nature. For that reason, if for no other, the experience which would be gained by our flying officers in Somaliland would undoubtedly prove of the utmost value to the Services.

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A New and Wonderful Record.

Almost day by day new records in aviation are created, and so accustomed does one become to hearing of them that they almost pass unnoticed — even unrecorded. That recently set up by Gilbert, in flying round France in two days, during which he covered the trifling distance of a couple of thousand miles falls within a different category to those of which we have spoken and which create nothing more than a passing interest. It is a performance of such outstanding merit as almost to form a landmark in the history of aviation, not only because of the distance actually covered during the flight, but because it affords such a remarkable demonstration of the utility of the aeroplane for purposes of travel. Our readers will grasp our meaning if they refer to the map which is printed on another page of this issue, showing Gilbert's itinerary for the two days' flight.

The actual distance flown has previously been approximated, though not equalled, but the singular merit of Gilbert's flight lies in the fact that it was not confined to circling round a closed circuit, but was a true cross-country journey, such as will have to be taken in the stride, as it were, of the commercial machine of the future. It was a truly utilitarian journey—one of the kind that is calculated to do incalculable good for the cause of flight, because of the wonderful reliability displayed by his machine, in combination with other qualities of speed and regularity. It was one of the best—the best, in fact, of answers to the oft-repeated argument that the aeroplane can never be anything more than a vehicle of sport and war. It well foreshadows the time when it will be a commonplace incident of our daily life to take our journeys by air, as being the most direct as well as the swiftest of all ways of getting from place to place.

We do not forget the proverb which tells us that one swallow does not make a summer, and admittedly this flight of Gilbert's does not necessarily mean that we can get ready at once to scrap the more ancient means of locomotion. But it certainly does seem to bring nearer the time when travel by air will be as usual as on the more stable mediums, for what the expert can do to-day will undoubtedly be done by the less skilled to-morrow.

The Ownership of the Air. Although it has nothing to do with the position here, the recent judgment of the Civil Tribunal of the Seine regarding the ownership of the air is interesting as being one of the first definite pronouncements regarding this very indefinite question of the ownership of the air. According to this judgment, although the owner of the land possesses rights in the air, these only extend to the height of trees and buildings. Above these, it was held, the air is free to all. By way of seeming paradox, however, the Court held that certain airmen had, as a matter of fact, flown too low over land, which was the subject of an action for aerial trespass, and condemned them to pay damages to the landowner.

It is a doctrine of English law that the rights of the landowner extend *usque ad cœlum*, and so far there are no decisions limiting this right, but then it must be remembered that the evolution of the doctrine developed during a time when the air was not used for locomotive purposes. The strong probability is that if the right of circulation were seriously challenged, the English courts would decide practically along the lines of the French decision under notice. The main point of it all seems to be that aerial law is still in the making and that it is practically impossible to settle a workable code out of hand. Like all other laws and codes of laws, it will have to undergo a process of more or less gradual evolution.

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Their Majesties' Sympathy with Dr. Hamel.

IN his great bereavement it must have been some consolation to Dr. Gustav Hamel, M.D., M.V.O., the father of the late Mr. Gustav Hamel, to receive the following message of sympathy from their Majesties, the King and Queen :—

"Buckingham Palace, May 27th, 1914.

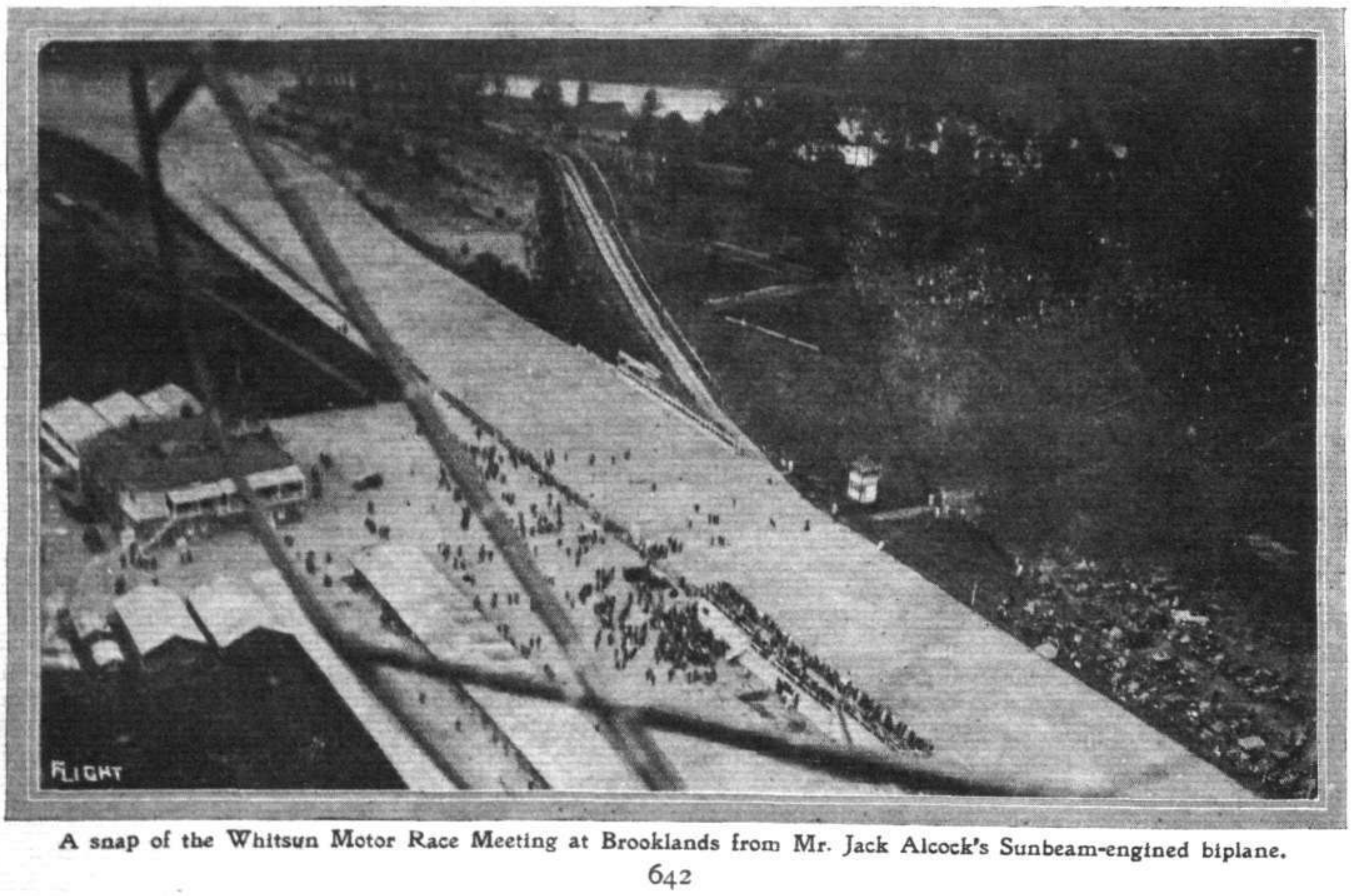
"Dear Sir,—The King and Queen, fearing that the worst must now be realised as to the fate of your son, desire me to assure you how deeply they feel for you in your sudden and grievous sorrow.

"Their Majesties knew your son personally. They had seen him fly on two occasions at Windsor this year, and were struck by the skill, courage and mastery with which he controlled the aeroplane, no less than by his modest and unassuming bearing.

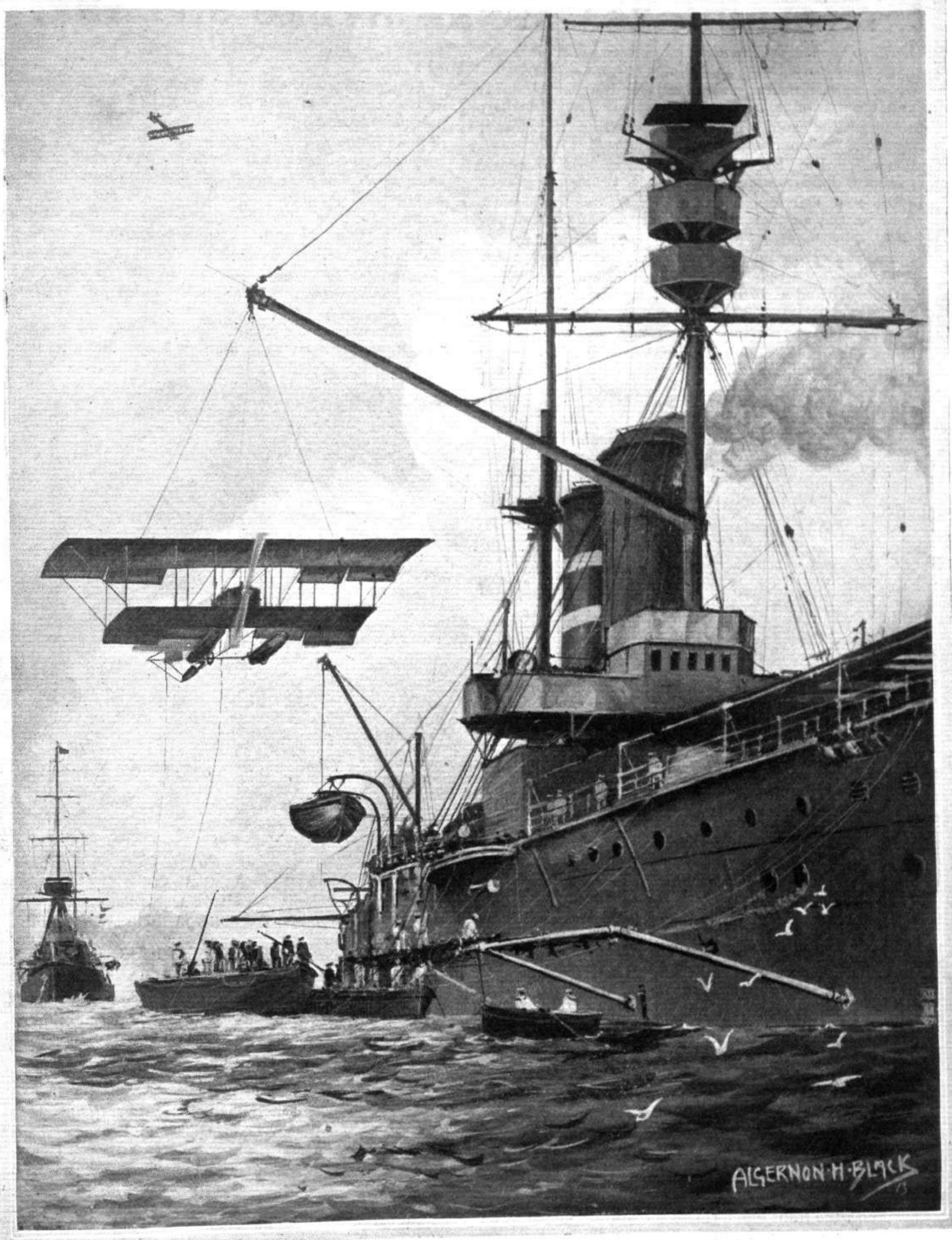
"In offering you their heartfelt sympathy their Majesties recognise that in this young, useful life the country loses its most accomplished and experienced aviator.—Believe me, dear sir, yours very truly.

"STAMFORDHAM.

Dr. Hamel has delayed publication of the letter, hoping for the return of his son, but he now feels that the public and the many friends of his son are entitled to know of their Majesties' letter.



A snap of the Whitsun Motor Race Meeting at Brooklands from Mr. Jack Alcock's Sunbeam-engined biplane.



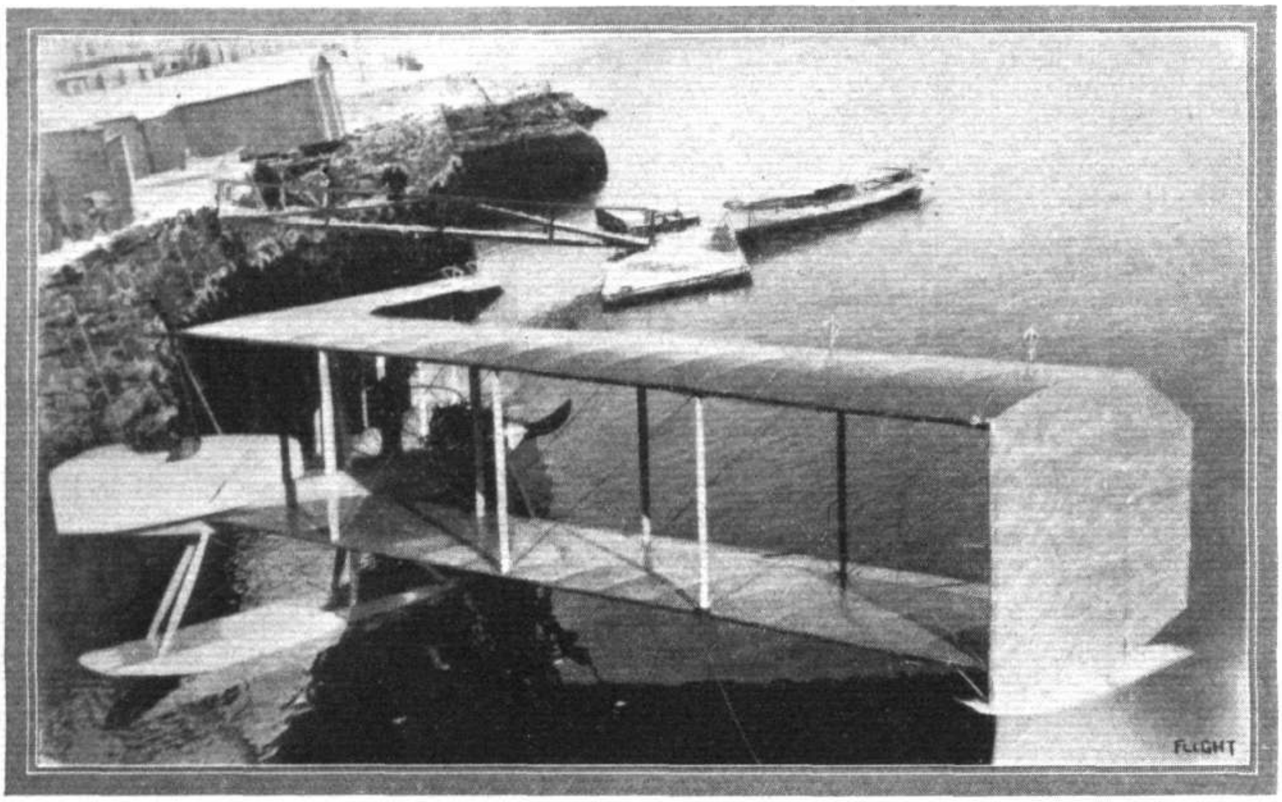
Hoisting a seaplane aboard H.M.S. "Hibernia."

THE BURGESS-DUNNE HYDRO-BIPLANE.

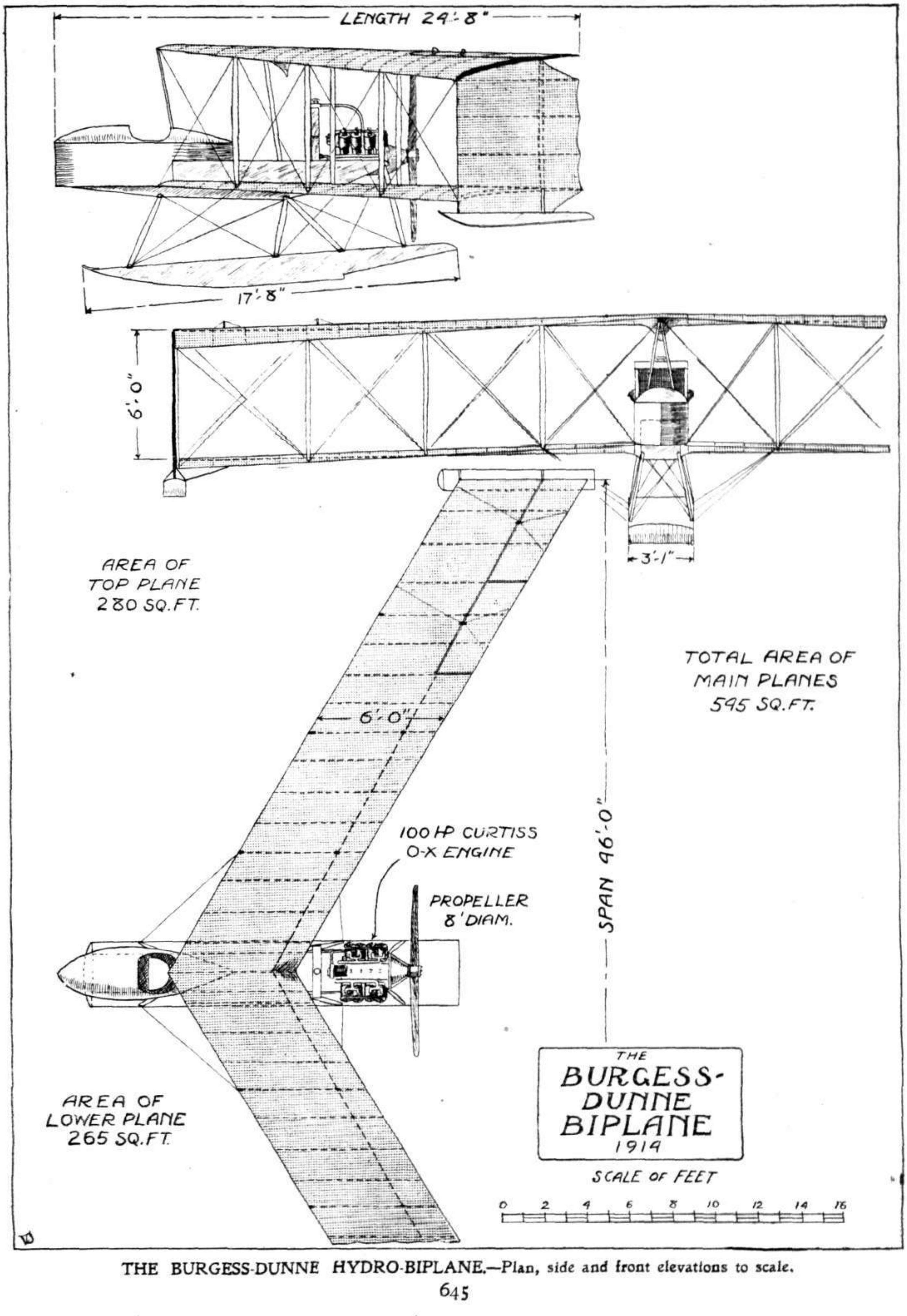
DURING the last four months some very successful trials have been carried out in the United States with a Dunne hydro-biplane manufactured by the Burgess Company and Curtiss of Marblehead, Mass., U.S.A., who have acquired the sole rights to manufacture the Dunne machines in America. The production of a hydro-aeroplane on the Dunne principle presented numerous technical difficulties, in fact Lieut. J. W. Dunne himself considered that the inherent stability and the balance, both in the air and on the water, would be seriously affected by the fitting of a float in place of the chassis, the former being considerably heavier and offering much more resistance than the latter. Mr. Burgess, however, set to work and went thoroughly into the matter of the Dunne principle, and after making exhaustive calculations as regards head resistance, weight, and centre of pressure under various conditions, he produced the first Dunne hydro-biplane, which balanced perfectly both on the water and in the air at the first time of asking. A comparison of the accompanying scale drawings of this machine with those of the land model published in FLIGHT for November 15th last, will show that except for the float, *nacelle*, and a few minor details, one does not differ from the other. In fact the principal dimensions and most of the constructional details are identical. It will, therefore, only be necessary for us to dwell briefly on the latter, so that we may confine our remarks to the modifications and actual performances. The swept-back planes are of the usual Dunne formation with the leading edge set at an inverted dihedral angle producing a negative angle of incidence at the tips, and are built up on two main spars of spruce, the front one forming the leading edge. The camber increases from practically *nil* at the centre to a maximum at the tips. It is to this peculiar formation that the Dunne machine owes its natural inherent stability, as has been described at length in the columns of FLIGHT.

At the centre of the lower plane is a short *fuselage*, rectangular in section and tapering fore and aft to a horizontal knife-edge. Mounted on the forward portion of this *fuselage* is a coracle-like *nacelle*, in which the pilot sits, whilst the rear portion carries the power plant. The latter consists of a 90--100 h.p. 8 cyl. Curtiss model O-X water-cooled engine driving direct an 8 ft. propeller. A single radiator is mounted immediately in front of the engine. The fuel and oil tanks, the former having a capacity of 22 gallons and the latter 4 gallons, are mounted on the upper *longerons* of the *fuselage*, two service tanks being placed within the latter just in front of the radiator.

The machine is supported on the water by a main central pontoon float 17 ft. 8 ins. in length and 3 ft. 1 in. beam, with a maximum depth of 15 ins. The float tapers to a horizontal knife-edge forward, and has a single hydroplane step at a point about one-third the length from the stern. It is divided into five transverse water-tight bulkheads. Four pairs of spruce struts of steam-line section connect the float with the *fuselage*, the whole "chassis" being strongly cross-braced with wire. An auxiliary float is mounted at the bottom of each side curtain at the wing tips in order to support the latter when the machine rolls sideways. These auxiliary floats are similar in shape to the main float, but have no step. The Burgess Dunne is controlled in exactly the same manner as the land machine is. This control consists of *ailerons* only, operated by two separate levers, the right-hand lever operating those on the right side and *vice versa*. To ascend both levers are pulled back, causing the *ailerons* on each side to move up, and thus force the wing tips—which virtually form the tail of the machine, being



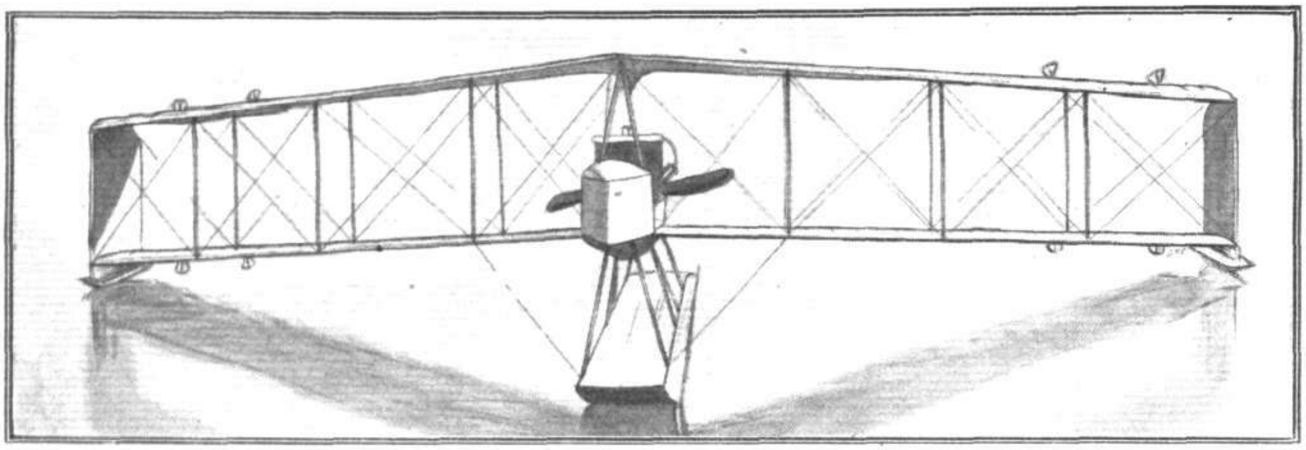
General view of the Burgess-Dunne hydro-biplane floating on the water.



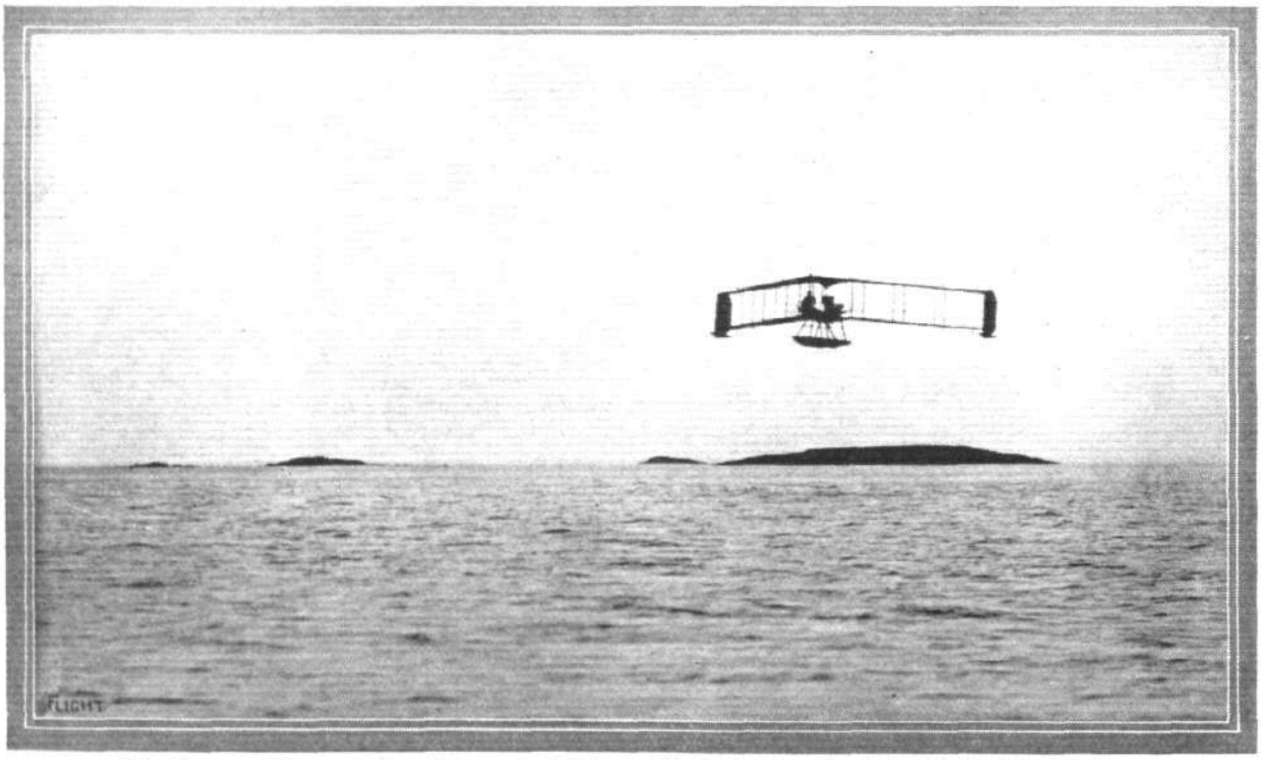
THE BURGESS-DUNNE HYDRO-BIPLANE.—Plan, side and front elevations to scale.

located at the rear of the centre of gravity—down, a movement equivalent to that of the ordinary tail-elevator. To descend, the levers are pushed forward, with the reverse effect. When it is desired to direct the machine to starboard, the left-hand lever is pushed forward and the right-hand one pulled back, and the reverse for steering to port.

As regards the actual performances of this machine, Mr. Burgess made a few hops shortly after it was launched the latter part of February, but owing to exceptionally bad weather it was not until a few weeks later that the first successful flights were made at Salem Harbour, with Clifford L. Webster in the pilot's seat. Even then the weather was all but favourable, except as a severe test for the machine. However, the trials proved to be entirely successful, the machine rising easily from the water at a gentle angle. During one of his flights he locked the control levers and let the machine fly by itself. On May 2nd Webster put the second Burgess-Dunne through its tests before a number of members of the Aero Club of America. The second machine possesses several modifications calculated to increase its efficiency, otherwise it is similar to the other model. The radiator in front of the engine has been removed and a passenger's seat put in its place, whilst two radiators have been mounted on the rear float-struts. The demonstration with the second machine was made in a stiff N.W. wind with a choppy sea. After flying about two miles out to sea towards the observers with his hands off the controls, Webster made four circuits at 200 feet, taking his hands off the controls during the last circuit when the machine rose to a height of 500 feet. He then cut off the motor, and, with his hands still above his head, descended in a spiral to about 100 feet, when he resumed control and made another circular flight. Rising to a height of 500 feet, Webster once again took his hands off the controls, and glided in a straight line towards the observers. When 50 feet from the water, he resumed



View from the front of the Burgess-Dunne hydro-biplane, showing how it is equally supported on the water by all three floats.



The Burgess-Dunne hydro-biplane in flight at Marblehead, piloted by Clifford L. Webster.

control, and, diving, alighted gently on the water and taxied to the observers' boat, to which the machine was moored for some time, withstanding the choppy sea exceptionally well. Another demonstration was made later on, in which Webster taxied some 200 yards away, and facing the observers he opened the throttle and raised his hands above his head. After hydroplaning for about 250 feet, the machine left the water and climbed gently to a height of 40 feet, when the pilot resumed control. Speed tests were also carried out, consisting of a run with and against the wind over a measured course of 1·2 miles. In one test the times taken were 59 secs. and 2 mins. 34$\frac{3}{5}$ secs., whilst in another the times taken were 38$\frac{3}{4}$ secs. and 2 mins. 38$\frac{4}{5}$ secs. The average speed over a triangular course in a 10 m.p.h. wind was 58·75 m.p.h. Numerous passenger flights were also made.

The principal dimensions of the Burgess-Dunne hydro-biplane are as follows:—Overall length, 24 ft. 8 ins.; span, 46 ft.; chord, 6 ft.; supporting area of main planes, 545 sq. ft.; weight of machine empty, 1,450 lbs.; useful load, 250 lbs.

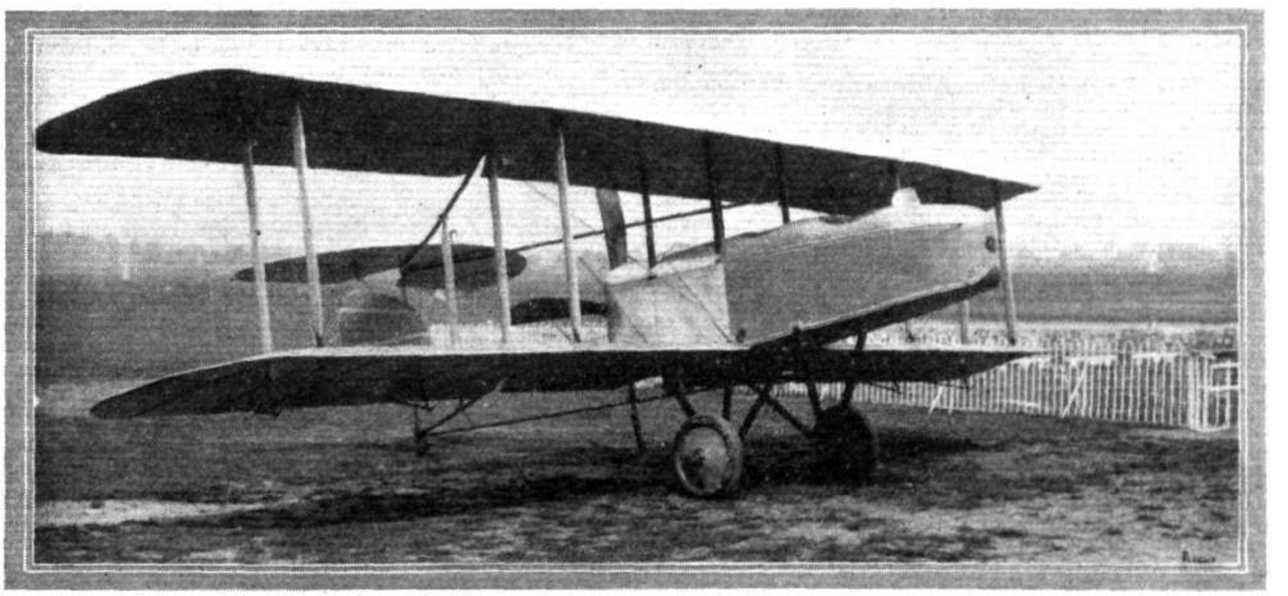
FLYING AT HENDON.

THE second June Meeting at Hendon, last Saturday, provided an excellent demonstration of man's mastery of the air, for a cross-country race was flown successfully under weather conditions that but a short time ago would have kept most machines in their hangars. The wind was blowing from the north-east in violent gusts of from 30 to 40 m.p.h., whilst to make matters worse — from the aviator's point of view — the heat from the sun, which shone brilliantly throughout the afternoon, gave rise to innumerable eddies of a very unpleasant character. Four o'clock was the time down on the programme for the start of the 30-mile cross-country handicap for the 100-guinea Cup presented by Mrs. J. B. Manio, but it was not until 5.30 p.m., after waiting in vain for the wind to lessen, that a start was made, the number of laps of the Bittacy Hill course being reduced from six to four. Mrs. Manio is the widow of the Italian aviator who met with a fatal accident in Lisbon a year ago, and who will be remembered in this country for his involuntary descent on a housetop at Palmer's Green, London, in December, 1912. Although the start of the race was delayed, several exhibition and passenger flights were made by the various Hendon pilots from 3.30 p.m., the first to ascend being Louis Noel, who put up a magnificent ten-minute fight with the wind on the 70 h.p. Maurice Farman. R. H. Carr went up next on the 50 h.p. G.-W. tractor biplane "Lizzie," climbing to an altitude of about 1,500 ft. and then executing a loop—a wonderful performance considering the strength of the wind. In descending he made a number of very sharp spirals. P. Verrier then took up a passenger on the 70 h.p. Aircraft-Maurice Farman, W. L. Brock following on the 80 h.p. Blériot with a lump of lead on the tail as passenger. After this there was a short interval and then Brock took up a passenger on the Blériot, and Verrier made two passenger flights on the Maurice Farman. At 5 o'clock, Carr gave another looping demonstration on "Lizzie." He made his first loop at about 1,000 ft., the wind catching the machine when at the top of the loop and tossing it about rather roughly before allowing it to regain its normal position. Climbing once again to the same height, Carr made a similar loop, after which he made a spiral descent. A start was then made for the cross-country race, there being four competitors as follows: Louis Noel on the 70 h.p. Maurice Farman (4 mins. 12 secs.); P. Verrier on a similar machine (2 mins. 52 secs.); R. H. Carr on "Lizzie" (1 min. 32 secs.); and W. L. Brock on the 80 h.p. Blériot (scratch). Brock's engine went on strike at the last moment and refused to start, and it looked as if he would be put out of the race, but eventually the engine repented and he got away after a delay of about a minute and a half. It was an evenly matched race, the machines going along fairly close together, and on rounding Bittacy Hill for the last time the first three were all in a bunch. Noel was leading first of all, then Verrier overtook him only to drop behind again shortly after, and for the rest of the race these two flew side by side, with Carr rapidly coming up behind. At the last moment Verrier once again shot ahead of Noel and looked as if he would cross the line first, but Carr, by diving, got in front and obtained first place by one second, Verrier being next, 13 secs. in front of Noel, whilst Brock came in a good fourth, 25 secs. behind, in spite of his delay in starting. Immediately after the race Mrs. Manio presented Carr with the Cup, Louis Noel being presented with a miniature cup as a consolation prize. As it was getting late only a few passenger flights were made after the race by Noel and Brock on the Maurice Farman and Blériot respectively.

Result of Cross-Country Handicap for Manio Cup.

(Bittacy Hill and back four times.)

		Handicap.	Handicap Time.
		m. s.	m. s.
1.	R. H. Carr (50 h.p. G.-W. tractor biplane)	1 32	25 20
2.	P. Verrier (70 h.p. Maurice Farman biplane)	2 52	25 21
3.	Louis Noel (70 h.p. Maurice Farman biplane)	4 12	25 34
4.	W. L. Brock (80 h.p. Blériot monoplane)...	scratch	25 59



"Flight" Copyright.

This photograph gives a good idea of the general arrangement of the new Grahame-White military biplane. At present the pilot occupies the front seat, but when the machine has been put through its experimental tests it is intended to reverse the positions of the pilot and passenger so as to allow of mounting a gun in the nose of the *nacelle*.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Diary of Events.

June 20 ...	*Daily Mail* Air Race. London–Manchester–London. Hendon Aerodrome.
June 27 ...	Balloon Race. Hurlingham Club, Fulham, S.W.
July 11 ...	International Correspondence Schools Race, London–Paris–London. Hendon Aerodrome.
July 11 ...	Balloon Race. Hurlingham Club, Fulham, S.W.
Aug. 1–15	*Daily Mail* £5,000 Circuit of Britain Race. Starting from Southampton Water.
Aug. 22–29	Gordon-Bennett Eliminating Trials. Upavon, Salisbury Plain.
Sept. 19–28	Gordon-Bennett Aviation Race. Buc, France.

HENDON AERODROME.

Members of the Royal Aero Club are admitted free to the Hendon Aerodrome on presentation of their Club Membership Cards. The Membership Card admits the Member only—motor cars must be paid for.

Daily Mail £5,000 Circuit of Britain Race.

The following entries have been received :—

Messrs. White and Thompson—

1. Curtiss Biplane. Two 100 h.p. Curtiss engines. Pilot: Mr. A. Loftus Bryan.
2. Curtiss Biplane. 125 h.p. Anzani engine. Pilot: Capt. Ernest C. Bass.

Sopwith Aviation Co., Ltd.—

1. Sopwith Biplane. 150 h.p. Sunbeam engine. Pilot: Mr. C. Howard Pixton.
2. Sopwith Biplane. 100 h.p. English *monosoupape* Gnome engine. Pilot: Mr. H. G. Hawker.

Grahame-White Aviation Co., Ltd.—Grahame-White Biplane. 100 h.p. English *monosoupape* Gnome engine.

Messrs. A. V. Roe and Co., Ltd.—Roe Biplane. 150 h.p. Sunbeam engine. Pilot: Mr. F. P. Raynham.

Eastbourne Aviation Co., Ltd.—Tractor Biplane. 120 h.p. Green engine. Pilot: Mr. F. B. Fowler.

Blackburn Aeroplane Co., Ltd. — Blackburn Hydro-Biplane. 130 h.p. Salmson engine. Pilot: Mr. Sydney Pickles.

Late entries will be received up to 12 noon, June 30th, 1914, in which case the Entrance Fee will be £150.

COMMITTEE MEETING.

A Meeting of the Committee was held on Tuesday last, June 16th, 1914, when there were present:—Col. H. C. L. Holden, C.B., F.R.S., in the Chair, Mr. Ernest C. Bucknall, Prof. A. K. Huntington, Major F. Lindsay Lloyd, Mr. F. K. McClean, Mr. Alec Ogilvie, Mr. Mervyn O'Gorman, C.B., Mr. C. F. Pollock, Mr. T. O. M. Sopwith, and the Secretary.

The late Mr. Gustav Hamel.—On the motion of the Chairman, the following Resolution was unanimously passed :—

"The Committee of the Royal Aero Club desires to place on record its deep regret at the untimely death of the late Mr. Gustav Hamel, and at the same time to express its high appreciation of his personal skill, and the signal services he rendered to aviation. The Committee further desires to tender its sincere sympathy to the members of his family upon the bereavement they have sustained."

The Aero-Club de France, in a message of sympathy sent to the Club, referred to Mr. Hamel's many friends amongst French aviators.

A message of sympathy has also been received from the Aero Club of Russia.

New Members.—The following new members were elected :—William Henry Charlesworth, A. B. Ford, the Hon. Frederick Edward Guest, M.P., Leonard Hubert Jagenberg, Frits Koolhoven, Capt. Saunders, Lieut. T. R. Wells, and Lieut. Norman Wood-Smith, R.I.M.

Aviators' Certificates.—The following Aviators' Certificates were granted :—

793 Corporal Arthur Claud Robins, R.F.C. (Maurice Farman Biplane, Royal Flying Corps, Netheravon). May 21st, 1914.

794 Lieut. Ian Malcolm Bonham-Carter (5th Fusiliers) (Maurice Farman Biplane, Central Flying School, Upavon). May 25th, 1914.

795 Leonard Parker (Bristol Biplane, Bristol School, Brooklands). May 28th, 1914.

796 Percy Herbert Maskell (Henry Farman Type Biplane, Shoreham Flying School, Shoreham). May 28th, 1914.

797 Lieut. Gerald Goodwin Carpenter (1st Suffolk Regiment) (Grahame-White Biplane, Grahame-White School, Hendon). May 29th, 1914.

798 Lieut. John Collins (3rd Hampshire Regiment) (Vickers Biplane, Vickers School, Brooklands). May 29th, 1914.

799 Henry Racine-Jaques (Bristol Biplane, Bristol School, Brooklands). May 29th, 1914.

800 Thomas Smith Duncan (Vickers Biplane, Vickers School, Brooklands). May 30th, 1914.

801 Ronald Portman Cannon (Henry Farman Type Biplane, Shoreham Flying School, Shoreham). May 30th, 1914.

802 Midshipman David Sigismund Don, R.N. (Bristol Biplane, Bristol School, Brooklands). June 2nd, 1914.

803 Lieut. Kenneth Reid Van der Spuy (S.A. Defence Force) (Maurice Farman Biplane, Central Flying School, Upavon). June 2nd, 1914.

804 Sub-Lieut. Lancelot Tomkinson, R.N. (Maurice Farman Biplane, Central Flying School, Upavon). June 2nd, 1914.

805 Archibald Maskell (Henry Farman Biplane, Shoreham Flying School, Shoreham). June 2nd, 1914.

806 George Evelyn Cowley (Grahame-White Biplane, Grahame-White School, Hendon). June 3rd, 1914.

807 George John Lusted (Henry Farman Biplane, Shoreham Flying School, Shoreham). June 3rd, 1914.

808 Charles Weber (Grahame-White Biplane, Grahame-White School, Hendon). June 5th, 1914.
(Subject to permission of Aero Club of Hungary.)

809 Rupert Henry Steinbach (Vickers Biplane, Vickers School, Brooklands). June 6th, 1914.

810 John Philip Wilson (Vickers Biplane, Vickers School, Brooklands). June 8th, 1914.

811 Lieut. John Edward Tennent (Scots Guards) (Vickers Biplane, Vickers School, Brooklands). June 9th, 1914.

812 Geoffrey Hugh Eastwood (Bristol Biplane, Bristol School, Brooklands). June 9th, 1914.

The following Certificate was passed in France :—

Jean Marie Landry (Blériot Monoplane, Buc). May 30th, 1914.

British Balloon Records.—The Committee decided to accept as British Balloon Records the following :—

Holder of Record ...	The late Mr. A. E. Gaudron, Lieut.-Col. E. M. Maitland and Mr. C. C. Turner.
Balloon	"Mammoth," capacity 107,963 c.f.
Date	November 18th, 1908.
Voyage effected ...	Crystal Palace to Mateki, Derevni, Russia.
Distance	1,117 miles.
Duration	36½ hours.

Accidents Investigation Committee.—On the motion of Col. H. C. L. Holden, the report on the fatal accident to Mr. Philippe Marty was unanimously adopted, and ordered to be published *in extenso*.

(Full report will be found following these Notices.)

Prize for Safety Belts.—On the recommendation of the Accidents Investigation Committee, it was decided to offer a Prize of £50 for the most suitable form of Safety Belt. The details were left in the hands of the Accidents Investigation Committee.

Suspension of Ralph M. Brown, American Aviator.—Letter was read from the Fédération Aéronautique Internationale, notifying the suspension, by the Aero Club of America, of Mr. Ralph M. Brown, from May 13th, 1914, until August 13th, 1914, for flying over the City of New York on May 9th, 1914.

Daily Mail £5,000 Prize, Circuit of Britain Race.

The Contest for the *Daily Mail* £5,000 will start from Southampton on Saturday, August 1st, 1914, at 6 a.m.

The Royal Motor Yacht Club has kindly arranged to extend Honorary Membership of its Club to the Members of the Royal Aero Club from August 1st to 10th, 1914. The Headquarters of the Royal Motor Yacht Club is the "Enchantress," which is moored in Southampton Water off Netley Hospital, and the starting and finishing line for the Race has been fixed between the "Enchantress" and Netley Abbey.

In addition to the start and finish of the *Daily Mail* Race, Members may witness the various trials of the Motor Boats which

are to compete a week later for the British International Trophy for Motor Boats. For Members who are fond of sailing, there are six one design sailing boats belonging to the Royal Motor Yacht Club, which can be hired.

The Royal Motor Yacht Club have reserved a certain number of cabins on the "Enchantress" for the Members of the Royal Aero Club, and Members wishing to book cabins are requested to communicate with the Secretary of the Royal Aero Club.

Shed Accommodation at Southampton.—Arrangements have been made with the Hamble River, Luke and Co., Ltd., of Hamble, Hants, to accommodate the competing machines in their two large sheds. These will be available from July 25th, 1914.

Controls.—The Town Council of Ramsgate have undertaken to provide motor boats to patrol the alighting area at Ramsgate, and it is hoped that similar arrangements can be made at Yarmouth, Scarborough, Aberdeen, Oban, Kingstown and Falmouth. Mr. Perrin, the Secretary, is visiting Scotland this week for the purpose of fixing the Scottish controls, in conjunction with the Scottish Aeronautical Society.

The control at Kingstown, Dublin, will be in the hands of the Aero Club of Ireland.

Full details will be announced later.

Gordon-Bennett Eliminating Trials.

In order to select the three competitors to represent the British Empire in the Gordon-Bennett Aviation Race, to be held in France in September next, the Royal Aero Club will hold eliminating trials in which the following entrants will take part :—

Sopwith Aviation Co., Ltd.	Kingston-on-Thames
A. V. Roe and Co., Ltd.	Manchester
Vickers Ltd.	Erith
British and Colonial Aeroplane Co., Ltd.	Bristol
Cedric Lee Co.	Shoreham

The War Office and the Admiralty have kindly given facilities for the Trials to take place at the Central Flying School, Upavon, during the last week in August.

Shed accommodation for each competitor will be available on Thursday, August 20th, and the actual trials will commence about three days later. Each competitor will be allowed to enter three machines, and the tests will consist of (*a*) Slow Speed Test and (*b*) Speed Test. The Slow Speed Test consists of a flight in a straight line out and back of about 2 kilometres without touching the ground, at a constant height of not more than 30 metres. The speed shall be the mean of the speeds of the flights out and back, which must not exceed 70 kilometres per hour. The Speed Test will be over a circuit of about 8 kilometres, and the total distance to be flown is 200 kilometres.

The War Office and the Admiralty have kindly placed the Officers' Mess at the Central Flying School, Upavon, at the disposal of the Club for the accommodation of the Officials and competitors.

Election of Stewards of the Club.

The following Stewards of the Club have been elected for the current year :—

The Right Hon. The Earl of Lonsdale.
Prof. Sir J. H. Biles.
Brig.-Gen. David Henderson, C.B., D.S.O.
Sir Charles S. Henry, Bart., M.P.
Admiral of the Fleet Sir E. H. Seymour, P.C., G.C.B., O.M., G.C.V.O.
Hon. Arthur Stanley, M.V.O., M.P.

Balloon Races at Hurlingham.

Owing to inclement weather, the Balloon Race on Wednesday, June 10th, 1914, was abandoned.

The next race will be held on Saturday, the 27th inst., at 3 p.m., and will be a long distance contest for a cup presented by Mr. A. Mortimer Singer. Entries close Monday, the 22nd inst.

Members are admitted free to the Hurlingham Club on June 27th, on presentation of their Club Membership Cards.

International Correspondence Schools Race. London–Paris–London.

(*Under the Competition Rules of the Royal Aero Club.*)
Organised by the Royal Aero Club and the Aero-Club de France.
Starting and finishing at the Hendon Aerodrome,
Hendon, N.W.
SATURDAY, JULY 11TH, 1914.
PRIZES.

Fastest Time... 1st Prize : £500. Presented by the International Correspondence Schools.

Handicap .. 1st Prize : £300. Presented by the Royal Aero Club. 2nd Prize : £150. Presented by the International Correspondence Schools. 3rd Prize : £50. Presented by the International Correspondence Schools.

The Entrance Fee is £5 per aircraft, and entries will be received up till 12 noon, Saturday, June 27th, 1914. Late entries will be received up to 12 noon, Saturday, July 4th, 1914, in which case the Entrance Fee will be £10.

The Entrance Fee will be returned to each competitor who completes the course by 10 p.m. on Saturday, July 11th, 1914.

The Entry Form, which must be accompanied by the Entrance Fee, must be sent to the Secretary of the Royal Aero Club, 166, Piccadilly, London, W.

Full particulars and entry forms can be obtained from the Secretary, Royal Aero Club, 166, Piccadilly, London, W.

The Home Office has granted an exemption from Aerial Navigation Orders to all competitors taking part, permitting them to leave and enter England without alighting in a prescribed landing area. Exemption has also been granted permitting Foreign Competitors to fly direct to the starting point, Hendon Aerodrome, between July 8th and 11th, and also to return from England between July 11th and 14th without landing in prescribed areas. The course to be flown under this exemption is *viâ* Folkestone.

ACCIDENTS INVESTIGATION COMMITTEE MEETING.

A Meeting of the Public Safety and Accidents Investigation Committee was held on Tuesday, June 16th, 1914, at the Royal Automobile Club (by kind permission) when there were present :—Col. H. C. L. Holden, C.B., F.R.S., in the Chair, Eng.-Lieut. E. F. Briggs, R.N., Mr. Alec Ogilvie, Mr. Mervyn O'Gorman, C.B., and the Secretary.

Fatal Accident to Capt. C. P. Downer.—The draft report was finally approved and ordered to be submitted to the Committee.

Fatal Accident to Capt. C. R. W. Allen and Lieut. J. E. G. Burroughs.—The reports of the National Physical Laboratory on the various tests carried out by them, were considered and the Committee's report was drafted.

COMPETITIONS COMMITTEE MEETING.

A Meeting of the Competitions Committee was held on Tuesday last, June 16th, 1914, when there were present: Col. H. C. L. Holden, C.B., F.R.S., in the Chair, Mr. Ernest C. Bucknall, Capt. A. E. Davidson, R.E., Major F. Lindsay Lloyd, Mr. Norman C. Neill, Mr. Alec Ogilvie, Mr. Mervyn O'Gorman, C.B., and the Secretary. In attendance : Major W. S. Brancker.

Gordon-Bennett Eliminating Trials.—The report of Major W. S. Brancker and the Secretary on their visit to Upavon was received. The arrangements made by them for the trials were approved.

***Daily Mail* Circuit of Britain Race.**—The Secretary reported the arrangements which he had made for the Race, which were approved.

International Correspondence Schools Race, London–Paris–London.—The following handicappers were appointed : Mr. J. H. Ledeboer, Mr. A. G. Reynolds (representing the Royal Aero Club) and the Marquis J. de Lareinty Tholozan (representing the Aero-Club de France).

166, Piccadilly, W. HAROLD E. PERRIN, Secretary.

ACCIDENTS INVESTIGATION COMMITTEE OF THE ROYAL AERO CLUB.

REPORT No. 23.

REPORT ON THE FATAL ACCIDENT TO MR. PHILIPPE MARTY, WHEN FLYING A MORANE SAULNIER MONOPLANE AT THE LONDON AERODROME, HENDON, N.W., ON SUNDAY, APRIL 26TH, 1914, AT ABOUT 6 P.M.

Brief Description of the Accident.—Mr. Philippe Marty was flying a Morane-Saulnier Monoplane fitted with a 60 h.p. Le Rhône motor, at the London Aerodrome, Hendon, N.W., on Sunday, April 26th, 1914, at about 6 p.m. He had been flying in a normal manner up and down the Aerodrome for about ten minutes, at an altitude of about 300 feet, and was making a descent in small flat circles, switching his engine on and off. From a height of 40 feet the aircraft nose-dived to the ground. The pilot was fatally injured and died about two hours after the accident.

Mr. Philippe Marty was a French subject and was granted Certificate No. 816, on March 27th, 1912, by the Aero-Club de France.

Report.—The Committee sat on Tuesday, May 12th, 1914, and received the report of the Club's representatives. Eye-witnesses also attended before the Committee and gave evidence.

From the consideration of the evidence, the Committee regards the following facts as clearly established :—

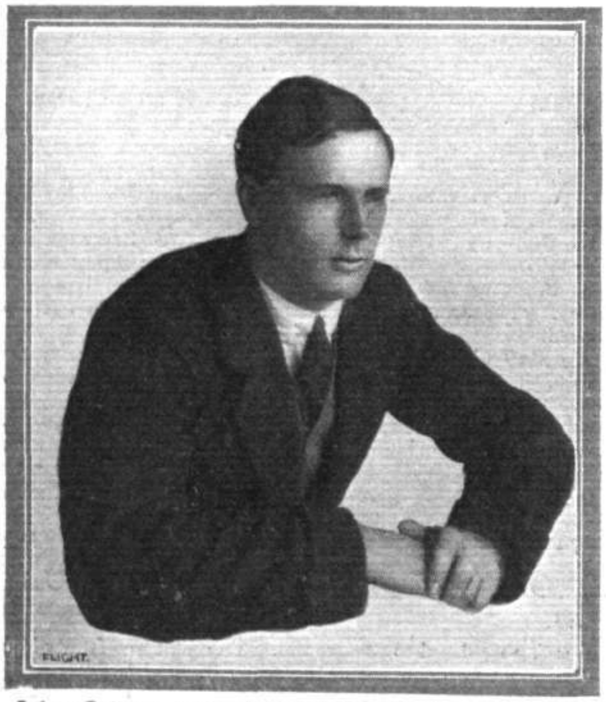
1. The aircraft was built in France during the latter part of 1913, and rebuilt at Hendon in March, 1914.

2. There was practically no wind at the time of the accident.
3. Mr. Marty, who was acknowledged to have great experience of flying, had made a previous flight earlier in the afternoon on the same aircraft, carrying out many evolutions.
4. Between Mr. Marty's two flights, the aircraft was flown by another pilot, who found it in proper working order.
5. The descent was made in circles slowly, with very little bank, the motor being switched on and off.
6. Mr. Marty had been warned only a week before of the danger of this particular manœuvre at an insufficient height from the ground.
7. The fatal injuries to the aviator were caused by his body being thrown violently forward and his head striking the part of the structure in front of him.
8. The aircraft was not fitted with a speed indicator.
Opinion.—The Committee is of opinion that the accident was due to loss of flying speed resulting in a nose-dive so close to the ground that recovery was impossible. The fatal injuries to the aviator were caused by his body being thrown violently forward and his head striking the part of the structure in front of him. The Committee is further of opinion that some form of quick-release safety belt of an elastic nature might be devised, which, without hampering the aviator's ordinary movements, would restrain such violent forward motion.
Recommendation.—The Committee recommends that every aircraft should be fitted with a speed indicator to show the speed of the aircraft at any moment, so that the pilot can tell when dangerous limits are being approached.

FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Eastchurch Flying Grounds.
Naval Flying.—There was very little flying last week owing to the very high wind on most days, the only machines out being :—
Monday (very windy and showery), No. 45 Caudron, 70 Maurice Farman, 31 Henry Farman. Tuesday (very windy), No. 3 Short and 24 Bristol tractor. Wednesday (very windy), No. 70 Maurice Farman. Thursday (very windy and wet afternoon), No. 70 Maurice Farman. Friday (windy), No. 31 Henry Farman and 24 Bristol ; Lieut. Babington on No. 21 Short tractor from Isle of Grain, staying a short time then returning to Grain. Saturday and Sunday (very windy), no flying.
Civilian Flying.—Monday and Tuesday, Mr. Alec Ogilvie was out on his 50 h.p. N.E.C. Wright biplane making short flights. Tuesday, Mr. Gordon Bell with Mr. Fairey as passenger, putting Short tractor through its test before handing over to the Admiralty.

Brooklands Aerodrome.
ON Monday morning, last week, Blériot, Vickers and Bristol pupils at work ; in the afternoon, Mr. Sippe on Bristol "Scout," Lord Carbery afterwards going up on same machine, and being so favourably impressed with it that he decided to buy it. Mr. Robin Skene for passenger trip on Martinsyde monoplane. Mr. Pixton arrived on Sopwith "Scout." Bristol, Vickers and Blériot pupils again out.
Messrs. J. E. Tennant and J. P. Wilson passed their *brevet* tests Tuesday morning in good style on Vickers biplanes, the former going up to 2,000 ft. in the altitude test, and the latter 600 ft.



Mr. John Collins, who obtained his pilot's certificate at the Vickers Flying School, Brooklands, on May 29th.

Vickers, Bristol and Blériot pupils out. Mr. Alcock to Shoreham on 100 h.p. Sunbeam, with Mr. Harold Lane as passenger. Mr. Mahl on 80 h.p. Sopwith. Mr. Dukinfield Jones for several flights on the D.F.W. Mr. Robin Skene for first trip as pilot on Martinsyde monoplane (Mr. Waterfall having been called up for service at Netheravon, Mr. Skene will now pilot his machine). In the afternoon, Mr. Pixton to Farnborough on Sopwith "Scout," Mr. Goodden from Hendon on the late Mr. Hamel's looping Morane, Mr. Jullerot on Bristol biplane, Mr. Gower on a Blériot, Mr. Skene

Mr. R. P. Cannon, another pilot who has just secured his certificate at the Shoreham Flying School.

again on Martinsyde, Mr. Wilberforce on 45 h.p. Anzani-Blériot, Mr. Mahl solo and with passengers on 80 h.p. Sopwith, Mr. Goodden looping, turnovers and tail slides on Morane, Mr. Dukinfield Jones solo and with passengers on D.F.W. Blériot, Vickers and Bristol pupils out. *Brevet* tests in good style on Bristol biplanes by G. H. Eastwood (altitude 1,000 ft.) and Capt. Walcot (A and B tests only).
On Wednesday, no flying in morning. In the afternoon, Mr. Goodden, with Paul Gondre as passenger, started for Tunbridge Wells on the 80 h.p. Morane. Departure of Bristol "Scout" for delivery to Lord Carbery.
With a wind blowing up to 40 miles an hour there was no flying on Thursday.
Friday morning, Messrs. Merriam and Stutt out on Bristol biplanes with pupils and passengers, Mr. Dukinfield Jones on D.F.W., Mr. Mahl with passenger on Sopwith biplane, Mr. Raynham testing new standard 80 h.p. Avro ordered by R.F.C. In the afternoon, Mr. Mahl on 80 h.p. Sopwith, Mr. Raynham on 80 h.p. Avro, Mr. Stutt on Bristol biplane, Mr. Raynham looping on 80 h.p. Avro, Mr. Skene on Martinsyde, Mr. Gower on 50 h.p. Blériot, the de Bolotoff triplane out for engine test.
On Saturday, Mr. Raynham to Farnborough to deliver 80 h.p. Avro to R.F.C. ; in the afternoon, Mr. Hawker on Sopwith "Scout" and Mr. Raynham on another 80 h.p. Avro.
The thunderstorm lasting all Sunday afternoon stopped air work.

Bristol School.—Monday, last week, as passengers: Lieut. Nugent (6 trips), Mr. Adamson (3), Lieut. Moule (2), Mr. Rutledge (3), Mr. Charlesworth (2), Mr. Lucas. Solos by Mr. Chambers, Mr. Gresley (2) and Lieut. Richard.

Tuesday, as passengers: Mr. Lucas (6), Mr. Adamson (5), Mr. Charlesworth (3), Lieut. Nugent (2), Lieut. Britten, Lieut. Ames, Mr. Rutledge. Solos by Capt. Walcot (2), Mr. Eastwood (2). Capt. Walcot then took the first and second parts of his certificate, and Mr. Eastwood did the complete tests for his.

Wednesday and Thursday, tuition impossible owing to the high wind.

Friday, as passengers: Mr. Lucas, Lieut. Nugent and Mr. Treloar (2). Further tuition impossible.

Saturday, tuition impossible.

Vickers School.—Monday, last week, Messrs. Wilson and Miller solos on biplane.

Tuesday, with instructor: Lieut. Gillman and Messrs. Klingenstein and Warrand (new pupil). Messrs. Parker and Miller solos. Lieut. Tennant and Mr. Wilson both took *brevets* in excellent style. Lieut. Eberli solo.

Wednesday, Mr. Warrand on biplane with Knight. Wind and rain prevented any further school work for week.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Monday, last week, Messrs. Winter, Robinson and Boyesen solo circuits. Messrs. Wyles, Shepherd, Lui and Major Peck straights with Instructor Howarth in passenger seat.

Mr. Dunn straights with instructor and afterwards alone.

Tuesday, Major Peck, Messrs. Lui, Palmer and Shepherd straights with Instructors Barrs, Birchenough and Howarth. Messrs. Boyesen and Robinson solo circuits, afterwards Mr. Boyesen passing first and second parts of *brevet* tests. Mr. Dunn solo straights.

Friday, Messrs. Lui, Shepherd and Major Peck straights with Instructors Birchenough, Barrs and Howarth. Messrs. Lowe and Dunn solo circuits, &c. Mr. Courtnay (new pupil) rolling with instructor. Mr. Robinson solo circuits.

Beatty School.—Pupils out with instructor during last week, Messrs. MacLachlan, 36 mins; Cheung, 46; Ruffy, 32; Allen, 13; Bentley, 11; Capt. Bass, 43; Lieuts. Dalley, 136; Browning-Paterson, 30.

Princess Ludwig of Lowenstein-Wertheim has recently joined the school and made her first flight Friday morning, being up for 12 mins. Mr. Stewart out taking extra practice and flying very well.

Hall School.—Monday, last week, wind and rain. In evening, No. 1 Caudron was brought out and Messrs. A. L. Brookes and J. Rose made four and two good straight flights respectively. H. C. G. Allen was also out on his Blériot practising straight flights, but wind proved too strong for circuits, so machines were taken in.

Tuesday, at 6.30 a.m., J. Clappen in charge, Messrs. J. Rose, A. F. Arcier, A. L. Brookes and H. Gearing straights at 20 to 40 ft. Too windy for circuits. Later, J. L. Hall took up A. Charig on Avro. In evening Hall out on school Deperdussin.

Wednesday and Thursday, gale. Friday, very windy. J. L. Hall on Avro mounted to about 8,000 ft. and after being lost in the clouds for some minutes came down in 10-minute spiral *vol plané*. In evening wind dropped somewhat, and J. Clappen taking charge of school had No. 1 Caudron and Anzani-Deperdussin brought out, Messrs. A. L. Brookes, A. F. Arcier and H. Gearing flying the Caudron and J. Rose doing straights and hops on Deperdussin. Saturday and Sunday, gale blowing.

ROYAL FLYING CORPS (MILITARY WING).

WAR OFFICE summary of work for week ending June 13th, 1914:—

Concentration Camp.—Headquarters, Headquarter Flight, Aircraft Park, Nos. 2, 3, 4, 5 and 6 Squadrons.—The training programme, consisting of aircraft reconnaissances and tests, M.T. convoy schemes, experiments, lectures, conferences and committees, was continued throughout the week. Reconnaissances were carried out daily as ordered, with the exception of Friday, 12th inst., when, owing to low-lying clouds, observation was not possible. The results obtained in all branches of training have been very satisfactory. The camp was visited on the 11th inst. by the General Officer Commanding-in-Chief, Southern Command, who inspected the sheds, workshops and camp lines, and the troops on parade. He also attended a lecture by one of the Squadron Commanders on "Observation of Artillery Fire."

Tests.—Speed tests of machines of various ages, work and exposure, were held over a level course 1,342 yards long. Two runs in each direction were made and the mean taken. The following machines were tested:—Avro, 50 h.p., B. E.; Blériot, 80 and 50 h.p., Henry and Maurice Farman (1914). The highest speed was attained by the 70 h.p. Renault B.E., viz. 73 miles p.h., the lowest being the 50 h.p. Blériot, 58·28 miles p.h.

Climbing Tests.—Pilots had to climb 3,000 ft. as rapidly as possible, the machines being fully loaded (two-seaters carrying passengers). The following machines were tested:—Avro, 50 h.p., 70 h.p. Renault B.E., Blériot, Henry and Maurice Farman. The best performance was made by the 70 h.p. Renault B.E., in 9½ minutes.

Landing Tests were carried out over tapes 7 and 22 ft. high. The same types of machines as above were tested with the following best results:—

50 h.p. Avro, 7 ft. tape: 1st graze, 43 yds.; run, 60 yds.; total, 103 yds.

50 h.p. Blériot, 22 ft. tape: 1st graze, 76 yds.; run, 84 yds.; total, 160 yds.

Flying at night has been carried out on several occasions, when landings by the light of special flares have been successfully made.

ROYAL FLYING CORPS.

THE following appointments were announced by the Admiralty on the 11th inst.:—

Lieut.-Commanders F. L. M. Boothby, to the "Pembroke," additional, as Squadron Commander, for special service with Royal Naval Air Service (previous orders cancelled); and H. L. Woodcock to the "Pembroke," additional, as Squadron Commander for command of Farnborough Airship Station and of Naval Airship No. 4, temporary (previous orders cancelled), both to date May 29th. Lieut. R. B. Davies, to the "Pembroke," additional, as Squadron Commander, for special service with Royal Naval Air Service (previous orders cancelled), May 29th.

The following was announced by the Admiralty on the 15th inst.:

Lieut. D. H. Hyde Thompson, to "Pembroke," additional (T.), for duties with Aircraft, temporary, June 13th.

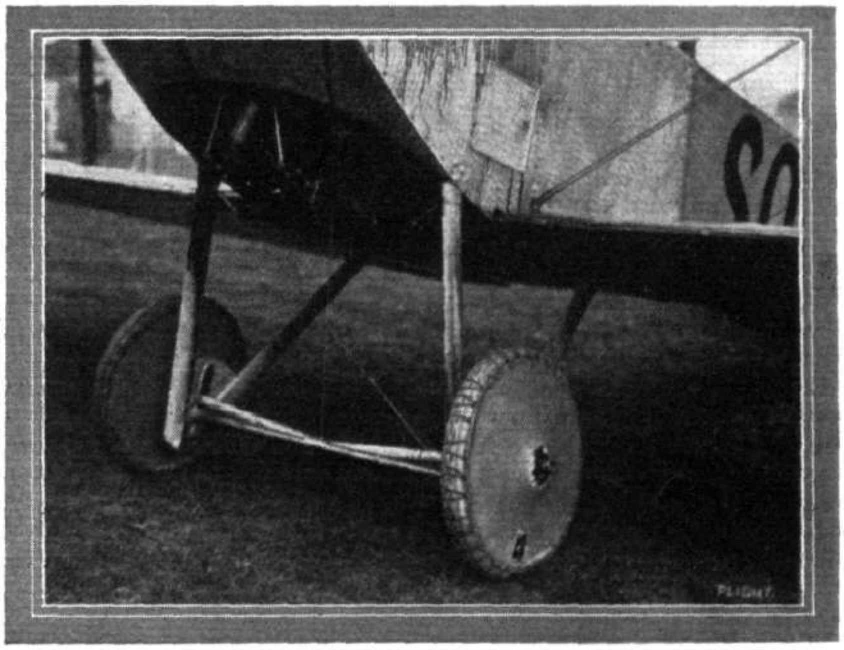
Indian Army Flying School.

THE following were notified in the *London Gazette* of the 12th:—

Indian Army Central Flying School.—To be Commandant—Capt. S. D. Massy, 29th Punjabis; December 1st, 1913. To be Instructors—Capt. C. G. Hoare, 39th Central India Horse; April 14th, 1914. Lieut. H. L. Reilly, 82nd Punjabis; December 28th, 1913. Lieut. C. L. N. Newall, 2nd Battalion 2nd Gurkha Rifles; November 17th, 1913.

R.F.C. to go to Portsmouth.

ARRANGEMENTS have now been made for the transference of No. 5 squadron of the Military Wing of the Royal Flying Corps to its new station at Fort Grange, Portsmouth, and the machines are to be flown there from Salisbury Plain during the first week in July.



"Flight" Copyright.

The special racing chassis fitted on the Sopwith Scout flown by Mr. Barnwell in the Aerial Derby.

HOW TO READ A GRAPH.

SEVERAL correspondents have asked us to give an explanation of how to read the graphs that frequently accompany articles in FLIGHT, and which are in general much used for the illustration of scientific facts.

A graph is a pictorial way of illustrating the relationship of one thing to another that depends upon it. For example, suppose the resistance of a certain object is known to vary as the square of the speed, it is possible to show this relationship pictorially by means of a graph. The way in which a graph is drawn is to take a piece of squared paper (Fig. 1), and to use the lower edge as a scale for measuring one of the variable quantities. The vertical edge is used for measuring the other variable quantity.

Let us, for the sake of example, suppose that we want to illustrate the relationship represented by a resistance that is always numerically equal to the square of the speed in miles per hour. In this case we will use the horizontal scale for the purpose of measuring the velocity, and each division shall represent, for convenience, say, 10 miles an hour. Similarly the vertical scale will be a measure of the resistance, and for convenience each division shall be, say, 100 lbs.

Taking the first division on the scale of velocity, the figure is 10, and the square of 10 is 100. The point corresponding to a velocity of 10 on the scale of resistance will be opposite the figure 100 on that scale. Above 10 and opposite 100 we therefore put a little circle or a dot. Similarly for the next division on the scale, the square of 20 is 400, so we put another dot above 20 and opposite 400 on the resistance scale, and so on opposite to 900 above 30 and opposite 1,600 above 40. Through the series of dots we draw a line, which is called a "graph." It passes through all the intermediate positions that we did not calculate, and thus in a simple accurate manner it completely presents the relationship between the two quantities speed and resistance.

Now being told that the resistance varies as the square of the speed may or may not have conveyed an adequate impression on the mind, but seeing this graph leaves absolutely no excuse for anyone to fail to recognise the extreme rapidity with which the resistance increases at high speeds. The steepness of the latter part of the curve shows that at a glance, and it is by studying the *slopes* of graphs that we are able to bear in mind the characteristic effects produced by various relationships that have experimentally been proved to be true.

In the making of tests, graphs are of the utmost utility

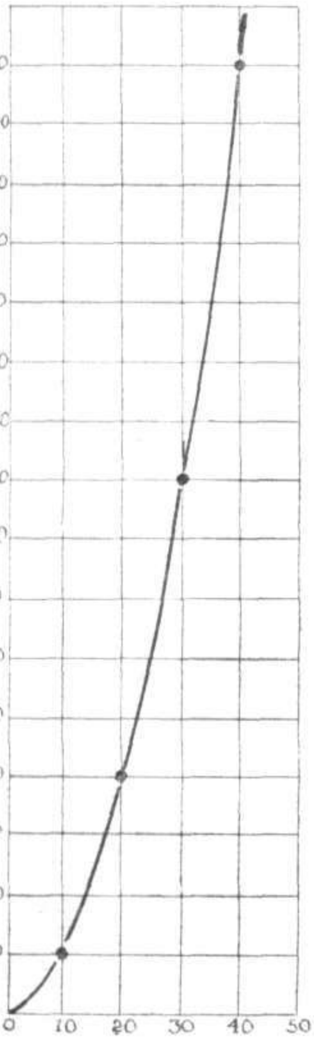


Fig. 1.

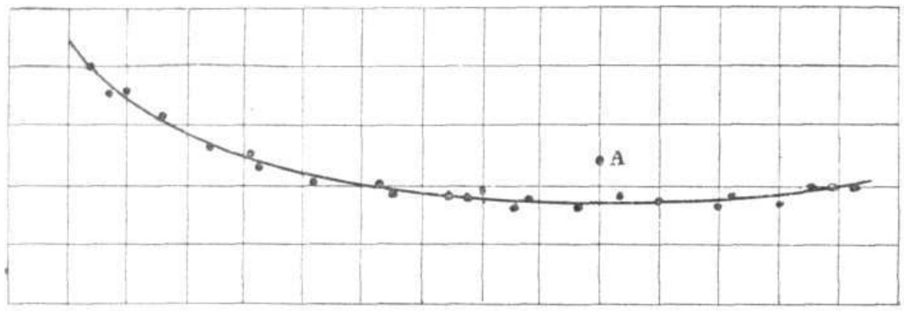


Fig. 2.

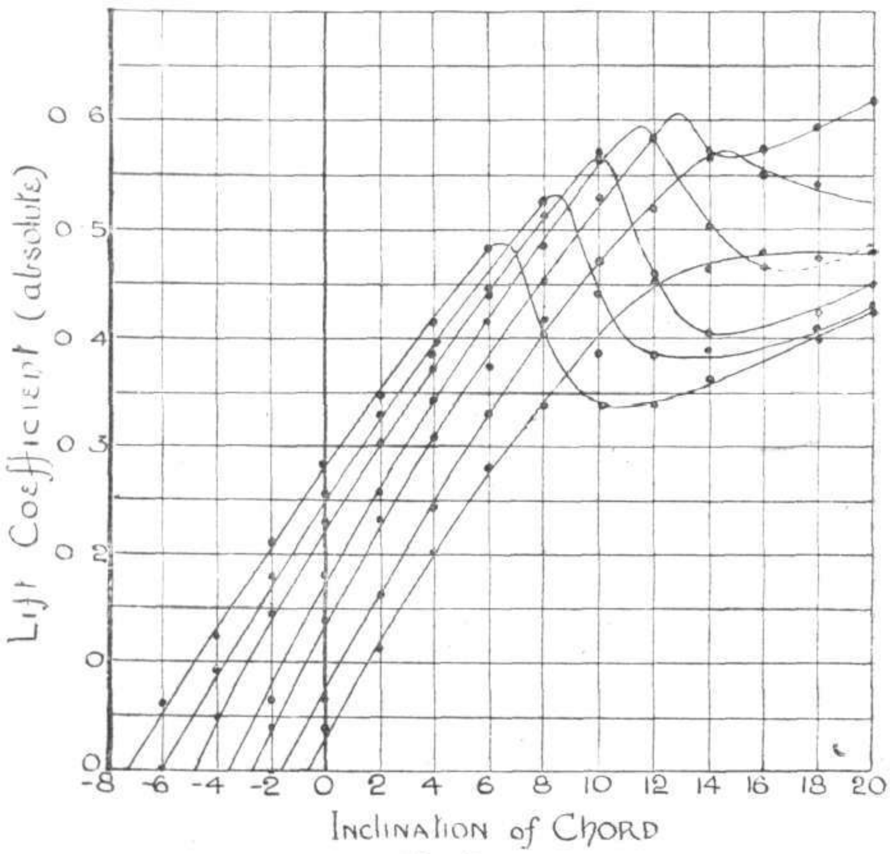


Fig. 3.

in presenting the results. For instance, when a great many tests have been made we shall have a great many pairs of figures each representing a relationship between the two variable quantities. By taking a piece of squared paper and marking off the divisions to any arbitrary scale we can insert the dots accordingly, and when they are all inserted we can draw a curve through them. (Fig. 2.)

Now if the majority of the dots cluster closely round the curve that is drawn through their midst it is proper to suppose the real relationship that holds good is represented by that curve, and in this way we may arrive at a mathematical expression for the relationship. If in the series there happens to be one dot far removed from the others (A, Fig. 2) it is a sure sign that something is peculiar about that particular test. This, therefore, draws attention to another purpose of the graph, which is that of checking a series of results by plotting them on squared paper so as to see whether they arrange themselves in proper sequence. Suspicion is immediately cast upon any isolated point that lies far removed from the others.

An excellent example of the use of a graph is that illustrating the relationship between lift and angle of incidence for a cambered wing. At a certain angle the conditions suddenly change, and as the angle increases the lift *decreases* instead of increasing, as it will be found to do up to that point. A graph shows the change immediately, and a series of such graphs serves as the best possible way of comparing a group of sections. Thus, a group of flat-bottomed wing sections having a variable height of camber was tested at the National Physical Laboratory, and it was found that the wing having the greatest camber reached its critical angle at the least amount of positive inclination (Fig. 3), whereas the thinner wings reached their critical angles at greater inclinations. Notwithstanding this, however, the group of curves illustrating the tests showed a likeness in their general form, and thus it is that such a graph may be said to be a "characteristic curve" for cambered wings as a class. Such curves, which are used in all branches of science and engineering, are often spoken of in these terms, and those interested in the subject are supposed to have the general form of the more important graphs clearly fixed in their minds, so that they may be able to use them as a common basis for discussion.

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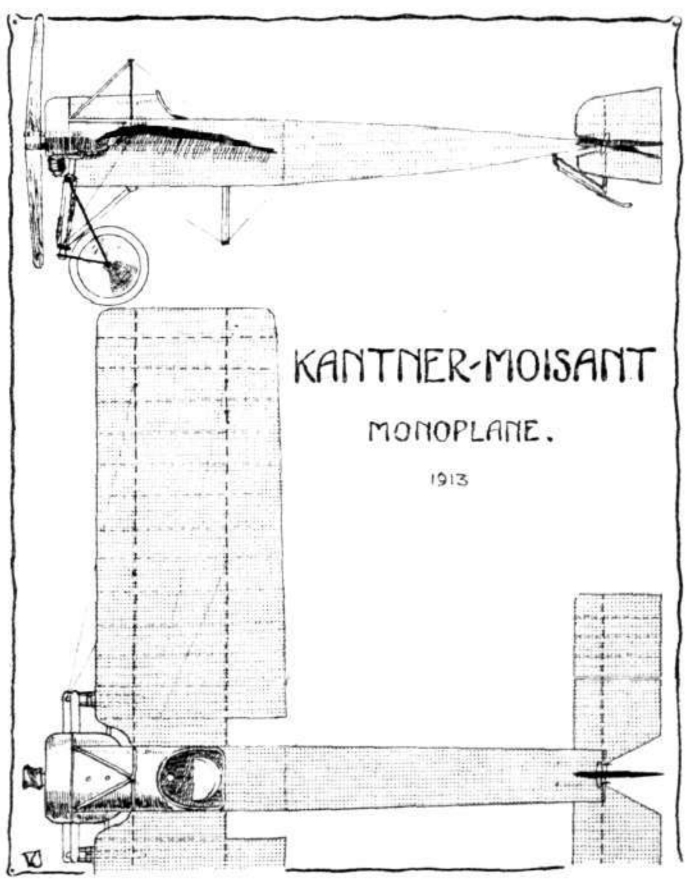
AEROPLANE TYPES.

THE KANTNER-MOISANT MONOPLANE.

AMERICA has not produced many monoplanes that could be called original in design, most of them being of the Blériot type, but in fairness it must be said that they possess many interesting points in details and construction. Such is the case with the Kantner-Moisant monoplane,



which was built by the Moisant Aviation Co. to the designs of Mr. Harold Kantner, who has piloted the machine himself with some considerable success. At first sight this machine resembles the Morane-Saulnier monoplane, but on closer inspection it will be seen that there are two or three distinct differences. In the first place, the main planes are almost rectangular in plan-form, the leading and trailing edges being of the same span; secondly, the landing chassis is of the Blériot type. The tail is of the balanced elevator type. The *fuselage* is of rectangular section from the nose to a point level with the trailing edge of the main planes, from whence it tapers to a horizontal knife-edge at the tail; it also decreases slightly in width from this point. The *fuselage* is built up in the usual box-girder style, wire braced, and is divided in the middle for the purpose of facilitating transport. The pilot's cockpit is situated well forward, while observation below is improved by cutting away a portion of the main planes at the leading edge of the main planes, and also from the rear spar to the trailing edge. The 50 h.p. Gnome engine is mounted in front of the *fuselage*, and is protected by an aluminium cowl or shield which extends to the cockpit, protecting the pilot from both wind and oil. The main planes are built up on two large spars, and taper slightly from root to tip. The top *cabane*, a pyramid of four steel tubes, is mounted well forward, and the wing cables have specially designed attachments whereby the detachment of the planes is easily and quickly accomplished. The chassis, of the Blériot type, slopes forward in order to bring the wheels well forward to prevent the machine from turning over on its nose. The principal dimensions of this monoplane are: Span, 30 ft.; length, 21 ft.; chord, 6 ft. (root) 5 ft. 9 ins. (tip); supporting area, 698 sq. ft.; speed, 70 m.p.h.

"VEE JAY."

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The German Triangular Race.

THE committee in charge of the Triangular Race over the Berlin-Leipzig-Dresden course, a report of which was given in our last issue, has issued its awards, the five leading places being: 1. Schuler (Ago biplane, 150 h.p. Benz), 1,274 kiloms. in 21h. 25m. 12s.; 2. Janisch (L.V.G. monoplane, 80 h.p. Gnome), 1,137 kiloms. in 24h. 52m. 51s.; 3. Koenig (Court monoplane, 100 h.p. Mercedes), 900 kiloms. in 7h. 33m. 20s.; 4. Langer (Hirth biplane, 100 h.p. Benz), 1,274 kiloms. in 22 hrs. 24 mins.

GYROSCOPIC ACTION OF ROTARY ENGINES.

THE EFFECT OF ALTERING THE POSITION OF THE AXIS OF ROTATION ON THE STABILITY OF AN AEROPLANE.

So much has been written in the past on the subject of the danger associated with rotary engines owing to gyroscopic effects, that it is somewhat refreshing to read of a suggestion whereby this action can be usefully employed for stabilising purposes on aeroplanes. Gyroscopic action becomes active in a machine propelled by a rotary engine when it is caused to deviate from a straight course, and it was, at one time, believed by many people that this gyroscopic torque was directly responsible for several fatal accidents that had occurred. It is now known that, ordinarily, no inconvenience is experienced by the pilot. The conclusion arrived at by the Departmental Committee that investigated the causes of accidents to Army monoplanes, the report of which appeared in FLIGHT for

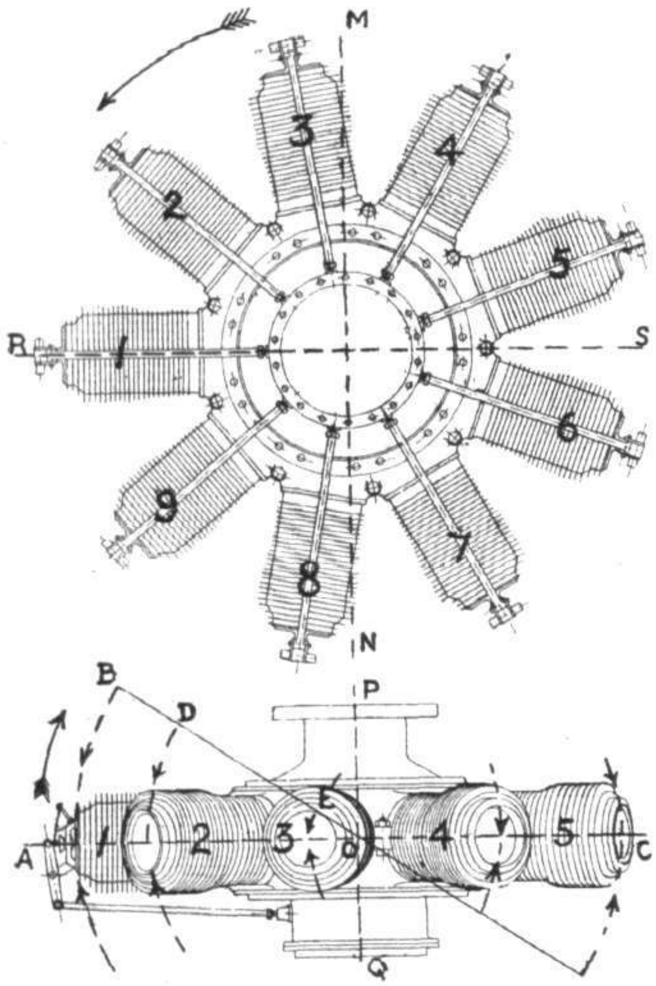


Fig. 1.

February 8th, 1913, was to the effect that the couple due to gyroscopic action does increase the stresses upon the engine mounting, and affect the steering, but "there is no reason to anticipate serious consequences on either ground." And in commenting upon its effect upon the steering it was observed that this might be "compared with that produced by a small gust of known direction, and should cause no difficulty to the flyer."

Much of the misapprehension that was then felt had its origin in the obscurity and mystery with which gyroscopic action was, and even now is, enshrouded; and it will not, therefore, be amiss if we first explain how it is produced, and the direction in which it is active.

It will be assumed that the engine in Fig. 1 rotates in an anti-clockwise direction about the crank-shaft as shown, and that while so doing it is caused to move, during a certain interval of time, through the angle AOB about an axis M N in the direction indicated by the arrow. Such a movement would correspond to that which is given to a rotary engine on a tractor machine during a right-hand turn. It will be seen that during the time that the angular displacement is being effected, the axial distance of each successive cylinder from the original plane of rotation undergoes considerable change. For example, when No. 1 cylinder moves from the vertical to take up the position occupied by No. 3 cylinder in the figure, its axial displacement is proportional to the perpendicular distance between E and the line A C in the plan; whilst when it has assumed the horizontal position, its axial displacement is proportional to the perpendicular distance between B and A C, and similar changes take place during the succeeding quadrants. Now these several angular positions are taken up in order by all the cylinders consecutively; and, therefore, the axial velocities of the cylinders are subject to continual variation during the revolution of the engine, being proportional to the perpendicular distance from the point considered on the cylinder to the vertical line, M N. To bring about these changes in velocity it is necessary that an accelerating force (which may be either positive or negative) should be impressed upon the cylinders, and since action and reaction are equal and opposite, an equal and opposite force is transmitted to the frame or support.

Let us now consider the direction in which these forces act. During the angular displacement of the rotating engine about the axis, M N, the cylinders are accelerated when passing through the upper left and the lower right-hand quadrants, and, therefore, the applied force must act in the direction in which the movement takes place; while in the remaining quadrants the cylinders have their axial displacements and velocities diminished, and hence must be subjected to a decelerating force. If we examine the directions of these applied forces we shall find that the cylinders, when above the horizontal line, R S, are acted upon by a force directed at right-angles to the plane of and passing downwards through the paper, while during their passage through the two quadrants below R S they are acted upon by a force at right-angles to the plane of the paper and outwards from it. Hence these two sets of forces which act in opposite directions on the two sides of the horizontal centre line, are the result of displacement of the engine about its vertical axis, M N, and the reactions upon the engine supports are as shown by the dotted arrows drawn in the plan—the arrows above the line A C showing the direction of these forces during the upper half and those below A C being for the lower half of the revolution.

It will now be apparent that a tractor machine fitted with an engine rotating in a clockwise direction viewed from the rear, will in making a turning movement to the right tend to dive, whilst in executing a left-hand turn, the machine will exhibit a tendency to tilt. In a similar manner, if the disturbing force causes a downward movement of the head of the machine, the gyroscopic couple will endeavour to move the nose towards the left hand.

The magnitude of the gyroscopic torque produced by any particular engine will depend upon the rate of change of direction or position, and varies inversely as the radius of the circle in which the machine is turning, and directly as the velocity of transit and as the speed of revolution, the square of the radius of gyration and the weight of the engine. For example, supposing that an aeroplane travelling at a speed of V miles per hour is steered round a circle of R feet radius; that the speed of revolution of

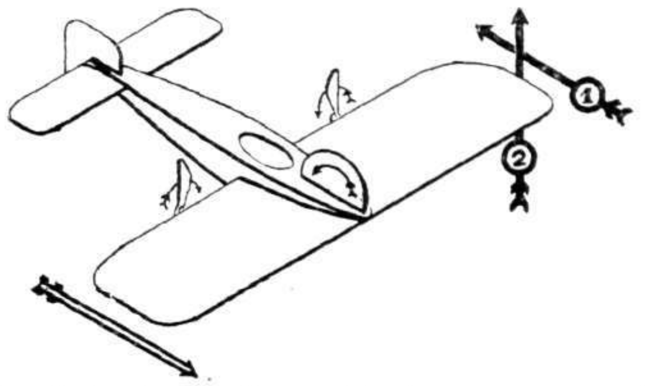


Fig. 2.—Machine making a right-hand turn—automatic banking.

the engine per minute is denoted by N, its weight being W lbs., and its radius of gyration λ feet. Then—

$$\text{Gyroscopic torque} = \frac{W}{g} \times \frac{V \times 5280}{60 \times 60 \times R} \times \frac{2\pi N}{60} \times \lambda^2$$
$$= 0 \cdot 0048 \, \frac{W\,V\,N\,\lambda^2}{R}$$

Also, if the moment of inertia is represented by I, the angular speed of rotation is ω radians per sec., and the angular speed of deviation is Ω, then we have the well-known expression—

$$\text{Gyroscopic torque} = I\omega\Omega$$

the units employed being either metric (kilos., metres and radians) or English (lbs., feet and radians).

Thus, if we consider the case of an engine running at a speed of 1,200 revs. per min., and having a radius of gyration of 1·1 ft. and a weight of 250 lbs., when the machine to which it is fitted is steered round a course of 200 ft. radius at a true speed of 70 miles per hour, the gyroscopic couple will amount to 610 lbs. ft. It should be observed, however, that the inertia of the machine will tend to materially retard the movement of the aeroplane as the result of this torque, and in this connection it is interesting to observe that Herr Otto Schlick, in a paper entitled "Gyroscopic effects of flywheels on board ship,"* stated that, for a powerful effect, it is necessary for

$$\frac{I\,\omega}{\theta\mu_0} = \frac{1}{5}$$

where I = moment of inertia of flywheel about the axis of rotation
ω = angular velocity of flywheel
θ = moment of inertia of vessel about the horizontal longitudinal axis passing through the c.g.
μ_0 = greatest angular velocity with which the vessel, without a flywheel, attains the middle upright position,

but that if the numerical value of the left-hand side of the equation is 0·1, the power of the appliance (Schlick's gyroscopic apparatus) will, in many cases, be sufficient.

In the preceding examination, no consideration has been given to the effect of the rotating propeller, because the couple produced by it is small by comparison with that from the engine; and, in addition, is variable in magnitude—its maximum and minimum values being attained when the moments of the axial accelerating forces acting upon the propeller-blade about the line of intersection of the plane in which the machine is moving with the plane of rotation of the engine are at a maximum and a minimum respectively.

In a recent number of the *Scientific American*, the novel suggestion is made that the axis of rotation of a rotary engine should be arranged transversely in the

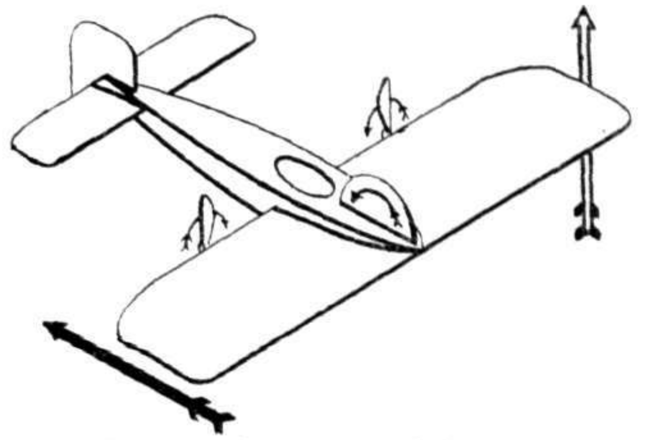


Fig. 3.—Left wing of machine struck by a wind gust.

machine, and that the direction of rotation should be anti-clockwise when viewed from the right-hand wing. To overcome any gyroscopic action due to the propeller effect, it is proposed that there shall be two propellers—driven by gearing, and rotating in contrary directions. Fig. 2 shows this arrangement applied to a monoplane in diagrammatic form, which has been taken (together with the remaining illustrations) from the above publication, but it is clearly evident that a similar design could be adapted for employment on a biplane. The proposal would appear to possess sufficient merit to render it worthy of closer examination.

It will be seen that no disturbance in the longitudinal plane can detrimentally affect the equilibrium of the

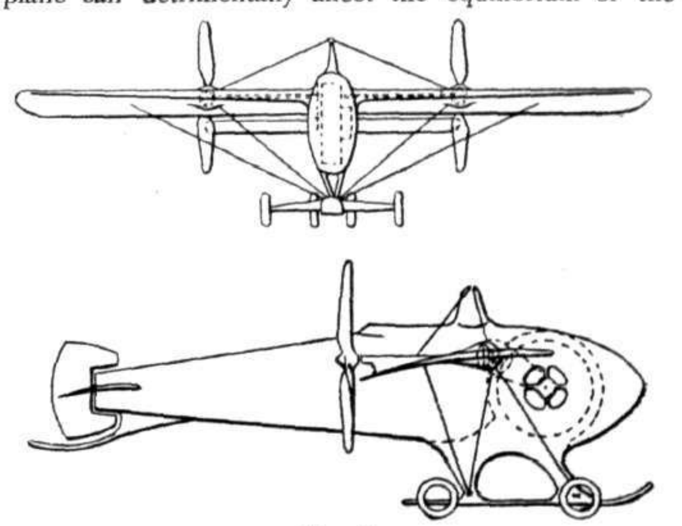


Fig. 4.

machine through gyroscopic action, since the movement will take place in the plane of rotation. When one wing only is affected by a head wing gust, the primary effect produced on the machine is that that wing is lifted and retarded. This causes the machine to tilt about its longitudinal axis, and in so doing rotates the motor about its horizontal axis, thus instituting a torque which tends to turn the nose of the machine towards the side on which the gust is encountered. These actions are illustrated in

* Transactions of Institution of Naval Architects—1904.

Fig. 2, as indicated by the arrows, the full arrows showing the direction of the applied forces and the unshaded arrow the resultant tendency due to precession. When a right-hand turn is made, as in Fig. 3, the engine is rotated about its vertical axis, the cylinders passing through the leading upper quadrant are decelerated—hence there is a torque tending to bank the machine over towards the right. These actions, as well as others that result from a disturbance in a lateral direction, and which will readily suggest themselves to the reader, are similar to those which a pilot endeavours to produce with the assistance of his controls; consequently, such an arrangement of engine would conduce to some degree of lateral stability; while, in addition, the mounting of the motor would be considerably facilitated, a better and more rigid framework of the body would be made possible, and the construction of the body would readily lend itself to a streamline formation of lower air resistance than is customary. The centre of gravity of the machine could also be lowered. It may be objected that these same forces will be at work during the time that the machine is being brought back to an even keel, but if the directions in which they are effective are examined, it will be found that they will normally assist, rather than retard, the restoring forces.

In regard to the constructional difficulties which might arise, it will be seen that some form of gearing would be absolutely essential, but in view of the high efficiency attained with modern gears, and the better efficiency of the propeller at lower speeds of revolution, this is not likely to altogether prohibit its adoption, as it has, in fact, been already successfully employed on many engines. Fig. 4 shows the completed arrangement of such a design on a machine fitted with two propellers, but it will be readily apparent that by the embodiment of either a bevel or a worm drive, preferably, as an integral part of the engine, it would be possible to drive a single screw placed either in front or at the rear of the main supporting surfaces.

THE ACTION OF THE CONTROL ORGANS OF AN AEROPLANE IN CRITICAL ATTITUDES.

The following is an abbreviated translation of a lecture by M. Louis Bréguet to Société Française de Navigation Aérienne :—

The two main problems which confront the aeroplane constructors are :

Firstly, to design machines capable of carrying their load with a small expenditure of power, while at the same time having motors capable of developing two or three times, or even four or five times as much power as is required for ordinary flight. These qualities are obtained by reducing the passive head resistance to a minimum, by refining the lines of the machine generally, and by giving the wings the best possible section.

Secondly, to bring out machines possessing a good stability in the air, and having control organs which are effective in all conceivable positions of the machine.

In this lecture I propose to deal with the study of the forces to which aeroplanes are subject, and the way of modifying the points of application of these forces by means of rudders, elevators and *ailerons*, in order to right a machine which has been thrown out of its normal attitude of flight.

The frequent accidents tend to give one the impression that the equilibrium of an aeroplane is very precarious, and that once the machine gets past certain attitudes the pilot is unable to control it and thus prevent a fatal accident. Is it true that these critical attitudes are so dangerous? Evidently not, for aviators like Pegoud, Chevillard, Garros, &c. have proved by actual experience that a machine can occupy all conceivable positions and yet be righted with ease. The critical conditions are: 1. Too low speeds. 2. Too high speeds. 3. Sideslips and dives.

1. *Too Low Speeds.*—When an aeroplane loses its speed the reaction of the air on its planes is insufficient to support it in spite of the increased angle of incidence. For angles of incidence of from 15 degrees the lifting forces do not increase with the angle of incidence, and for angles from 20 degrees they decrease. Generally when an aeroplane loses speed it turns over either to the right or to the left. This is what is called a sideslip. If the pilot tries to right his machine by warping he will only increase the sideslip, and if his motor is failing he can only right the machine by diving it until it has regained it flying speed. If the motor possesses great reserve power it is possible to right the machine before the sideslip has become very pronounced. Whilst this sideslip is, of course, dangerous when the machine is close to the ground, there is little or no danger when it is flying at an altitude sufficiently high to allow of regaining its speed by a dive. Besides, a machine with a proper *empennage* will not lose its speed unless the pilot wishes it to do so, and it does not seem necessary to fit an automatic control organ for the purpose of helping the pilot. It is, however, alway advisable to fit speed indicators which will keep the pilot informed as to the behaviour of his machine.

2. *Too High Speeds.*—It is generally admitted that the conditions of too high speeds present a certain danger. It has been said that aeroplanes flying at very small angles of incidence may, by a sudden longitudinal swerve or dive, receive a sudden pressure on top of their wings, and thus losing all sustentation, they fall.

The point to be studied with regard to high speeds is: How do the points of application of the forces to which an aeroplane is subject vary for possible variations in the angle of incidence during these high speeds? Experiments with scale models in the laboratories are very instructive, and it has been possible to verify that certain machines with too deeply cambered wings, or with insufficient *empennage* or badly adjusted, may become unstable when flying with very small angles of incidence. It should be remembered that for a cambered plane the centre of application of the resultant of the forces acting on it travels backwards, progressively as the angle of incidence decreases, and that for very small angles of incidence the travel of these centres is considerable.

At the Eiffel laboratory a series of experiments have been commenced with scale models of aeroplanes flying with the most critical angles of incidence by placing them in the air current, and the interesting results obtained lead to the conclusion that it is easy to design machines which the pilot can always right by means of the control organs.

3. *Sideslips and Dives.*—A fall started either by side-slipping or stalling always terminates, if the machine has a suitable *empennage*, in a vertical nose dive. The study of forces, acting on scale models, shows that even from this attitude the machine may be righted by suitably operating the control organs. The most important thing to observe is that the pilot is not thrown out of his seat, and that, thanks to an efficient safety belt he is able to operate his controls, whatever the attitude of his machine.

Suppose that a machine through some cause or other is making a nose dive, and that the pilot is strapped in his seat. He finds that he is unable to right the machine by operating his elevator—such a contingency occurs often, and many pilots have experienced it. The thing to do in a case like that is to push the rudder over as far as it will go, for instance, to the right, in order to make the machine turn to the right with relation to its vertical path of flight, and at the same time warp the wings so as to make the machine revolve around its longitudinal axis after the fashion of the hands of a clock. The aeroplane will then right itself by describing a spiral similar to those favoured by certain pilots in their exhibition flying.

A Prize for a Safety Belt.

It will be seen from the Official Notices of the Royal Aero Club on page 648 that the Committee, acting on a suggestion of the Accidents Investigation Committee, is offering a prize of £50 for the most suitable form of Safety belt.

The conditions under which the prize will be awarded are now being considered by the Accidents Investigation Committee. It will also be noticed that the Committee in their report on the fatal accident to Philippe Marty make a reference to the use of safety belts.

The British Gordon-Bennett Trials.

Both the War Office and the Admiralty are lending splendid assistance to the Royal Aero Club in connection with the organisation of the British Eliminating Trials for the Gordon-Bennett Cup which will be held at the Central Flying School, Upavon, during the last week in August. Shed accommodation for each competitor will be available on August 20th, and the speed tests will commence about three days later. The officers' mess at the C.F.S. has been placed at the disposal of the Royal Aero Club for the use of the officials and competitors.

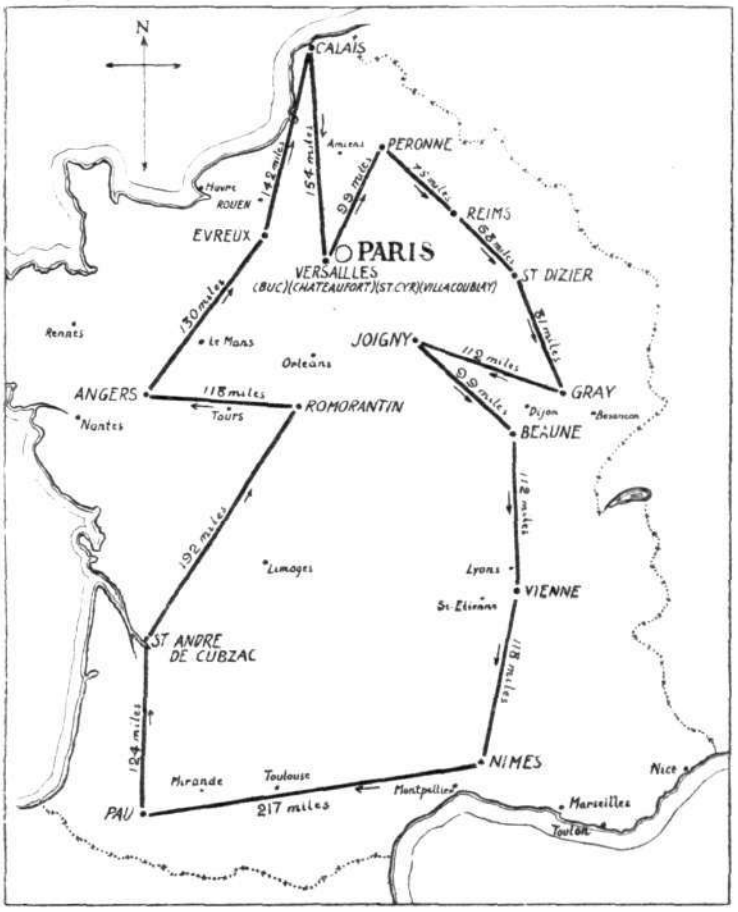
GILBERT'S FLIGHT ROUND FRANCE.

In last week's FLIGHT brief reference was made to the very fine flight round France made by Gilbert, and in the accompanying table will be found the distances between the various controls and the times of starting and arriving at each. Only once during the whole trip of 1,841 miles did Gilbert fail to reach the control set as his destination. Running out of petrol when near Mirande he had to make a forced landing, and as it was getting too dark to continue he decided to postpone the completion of the stage till the following morning. The fact that the weather conditions were extremely unfavourable makes the flight even more creditable.

As to the actual progress of the tour we can hardly do better than reproduce M. Gilbert's own account of his doings:

"I suddenly decided to make the 'Tour of France' for the Michelin Cup. The event appealed to me because instead of having to fly into a foreign country or to turn round and round like a squirrel in a cage the new regulations called for a flight which was of value as showing the utility of the aeroplane, while it would also be interesting.

"The day before the start I studied maps and routes in order to be able to find my way easily. In this manner I studied about



15 metres of maps—those nice coloured Government maps. I cut out the route for the journey which I had marked off with a straight line in blue pencil, leaving about 15 centimetres on each side. The strip thus formed I rolled up and found it to be of great use on my two days' journey. The start took place on June 8th at 3 a.m. from Villacoublay. As the day progressed it began to rain. Members of the Aeronautical Ligue of France had been requested to be on the aerodromes or controls where I had to land, at certain indicated hours in order to verify my passing and to sign my check card. At Peronne, the first control, where I arrived at 4.10, ahead of my scheduled time, nobody was up. However, the noise of my engine soon caused two heads to appear from the depths of a shed. I shouted and made desperate signs from the seat of my machine. The two heads—and the rest—came hurrying along, signed my card and I was off again. I continued to Rheims, tossed about by the wind and soaked by the rain. Landed on the military aerodrome, had my book signed and a few minutes later was on my way again. I had to rely upon my map and my compass for finding my way. As for the numbers painted on top of gasometers and roofs of houses, and intended for signposts for aviators, words fail me. These numbers will be very useful when an aviator can say to his passenger: 'I say, will you look in the Wirelessphone Directory and see what 346-68 stands for,' but until then . . . On the other hand, the hangars on the landing places are clearly visible and one can easily read the name, painted on the roof in black or white letters, of the county over which one is flying.

"Thanks to the careful arrangements of the Le Rhone firm replenishments were awaiting both my engine and myself at five different towns. At Gray Edouard Martin was waiting, at Vienne and Pau my mechanics, and at Evreux M. Verdet. I cannot emphasize too strongly the great service all rendered to me.

"The magnificent panorama which was unrolled beneath me on the first part of my journey and also during the latter part was one of the finest sights I have ever seen. Perhaps the dark weather contributed towards making the delicate shadings stand out more. I saw the North with its houses hidden amongst the trees; I saw the Vosges with its perched habitations, and the immense chain of the Cevennes, the summit of which was hidden in the clouds. Then the green prairies of Midi . . .

"I had counted on being able to spend the night at Pau, but unfortunately I had the wind against me from Nimes and night was approaching rapidly, so as I was near Mirande, I decided to stop there. The field in which I landed had been at one time used for an aviation meeting, but what I took to be a suitable landing ground turned out to be a field covered with one meter high grass, and I had several anxious moments.

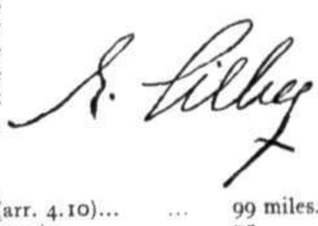
"'Eh! We thought you were dead,' said a peasant who came running up, followed shortly by several others. 'Eh! You are not ill? Eh! you come from Paris? . . .' After asking one of the peasants to look after my machine, I got them to show me the way to the nearest telegraph office so that I could reassure my friends before going to the hotel for a few hours' rest.

"When I woke up the next morning I could not at first make out why I was in that room, but then I suddenly remembered the 'tour.' I jumped out of bed and looked at the clock. It was half-past two! Some kind friends at the hotel who had promised to help me to start were all fast asleep. When I arrived at the field where I had left my machine the man in charge was sleeping peacefully under one of the wings. I roused him and was soon on the way to Pau. In the moonlight the white houses and the churches of Midi resembled vague shadows. In the distance arose the imposing chain of the Pyrenees.

"I arrived at Pau at dawn and left again a quarter of an hour later, keeping at an altitude of between 150–300 metres on account of the fog. I was assailed by a form of drowsiness and sang at the top of my voice in order to keep awake. After passing Evreux renewed courage seemed to come to me. I fancied that I was at the end of my journey. At this moment a terrible storm brought me back to merciless reality. In the middle of a violent hail storm flashes of lightning rent the sky on all sides and I expected to be struck by the lightning at any moment. Finally I arrived at Calais. With what haste I started for the last time towards 'home' 250 kilometres away.

"I was again surprised by a storm, and this time fell a victim to it as I had lost my bearings. After wandering about for nearly an hour I found myself flying along the sea. I descended, and, without stopping my motor, asked in which direction Paris lay. An hour and a quarter later I arrived at Villacoublay, and completed the voyage of 3,000 kilometres, not counting those extra ones covered on the last stage. The fatigue was not very great. I had the advantage of will-power, and will-power is able to overcome fatigue. My machine has been replenished five times, and I . . . the same number of times. Cold chicken at Vienne, cold chicken at Mirande, chicken at Romorantin.

"What chickens!"



JUNE 8TH.

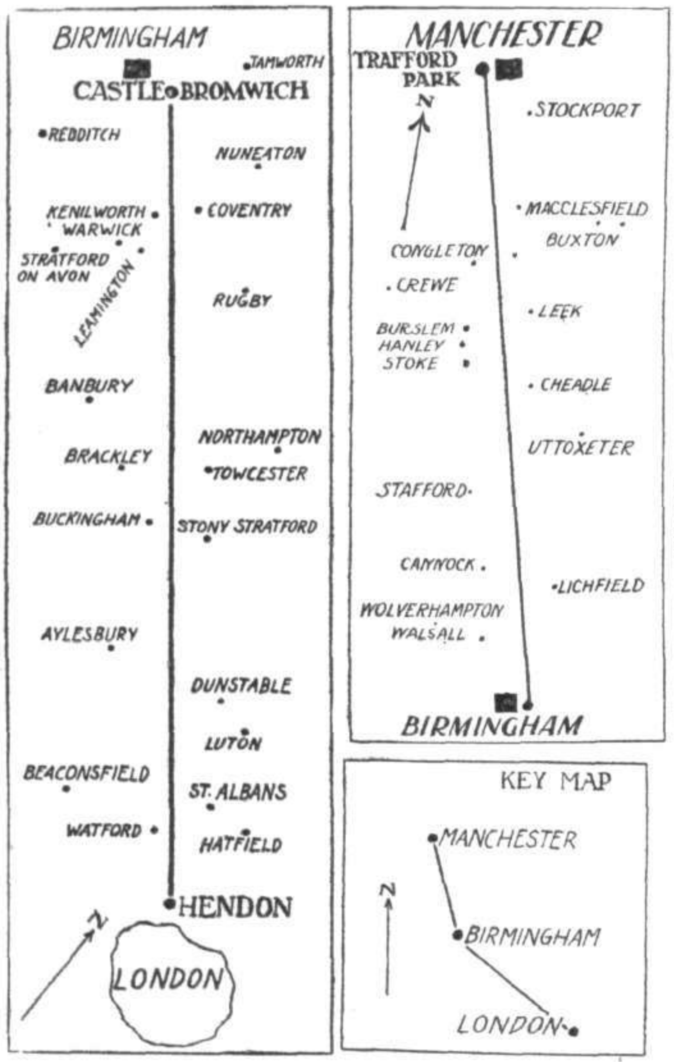
Villacoublay (dep. 3.1). Peronne (arr. 4.10)... ...	99 miles.
Peronne (dep. 4.25). Reims (arr. 5.20)	75 ,,
Reims (dep. 5.35). St. Dizier (arr. 6.10)	68 ,,
St. Dizier (dep. 6.15). Gray (arr. 7.30)	81 ,,
Gray (dep. 8.5). Joigny (arr. 9.40)	112 ,,
Joigny (dep. 9.50). Beaune (arr. 11.10)	99 ,,
Beaune (dep. 11.30). Vienne (arr. 12.50)	112 ,,
Vienne (dep. 1.30). Nimes (arr. 3.30)	118 ,,
Nimes (dep. 3.40). Ran out of petrol and landed at Mirande (arr. 8.15). Spent night here.	

JUNE 9TH.

Left Mirande at 3.15 a.m., and arrived at Pau (arr. 4)	217 ,,
Pau (dep. 4.15). Saint André-de-Cubzac (arr. 6.15)	124 ,,
St. André-de-Cubzac (dep. 6.30). Romorantin (arr. 9)	192 ,,
Romorantin (dep. 9.30). Angers (arr. 11.30) ...	118 ,,
Angers (dep. 11.40). Evreux (arr. 1.15 p.m.) ...	130 ,,
Evreux (dep. 1.35). Calais (arr. 3.50)	142 ,,
Calais (dep. 4). Villacoublay (arr. 6.39)	154 ,,
Total	1,841 miles.

LONDON TO MANCHESTER AND BACK AIR RACE.

THE air race from London to Manchester and back, *via* Birmingham, for the *Daily Mail* Trophy and "Pratt's" £750 prize, which will, all being well, be flown to-morrow, Saturday, will be vastly different to the "race" from London to Manchester of four years ago, when Claude Grahame-White gloriously lost the prize to Louis Paulhan. Then no special time or day was fixed for the start, any competitor starting as soon as he was ready, after having given the Royal Aero Club 48 hours' notice. This time, however, the competitors—and there are 14 entries—start at fixed times; it is, in fact, a handicap race. It is interesting to look back on the early event, for there were several incidents that form curious comparisons with what is likely to take place this time. For instance, on Grahame-White's first attempt, Mr. Perrin and two mechanics left in pursuit on a car as soon as the pilot had officially started, and not only kept the biplane in view for some considerable time, but arrived at Rugby about ten minutes ahead of it. A similar instance occurred



Sketch map of London-Manchester Air Race.

during Paulhan's flight, but in this case a special train containing Mm. Paulhan and Henry Farman accompanied the aeroplane as far as Rugby. With the speed of some of the machines in to-morrow's race we do not think that train or motor car will be able to keep up with the competitors.

Entries for to-morrow's race closed on Monday last, and the total number received was fourteen. A list of pilots and machines will be found in our accompanying table, from which it will be seen that with two exceptions all took part in the last Aerial Derby, so that for further particulars of the machines, &c., we would refer our readers to FLIGHT for May 22nd. The two exceptions are H. G. Hawker, who will fly the 100 h.p. Sopwith, and R. R. Skene, who will fly the Martinsyde monoplane. The course, which is shown by the accompanying sketch-maps, passes near such important centres as St. Albans, Dunstable, Birmingham, Leamington, Warwick, Walsall, Wolverhampton, Lichfield, Dudley, Sutton Coldfield, Stafford, Uttoxeter, Stoke, Hanley, Burslem, Macclesfield, &c., and totals to a distance of 322 miles. The competitors, besides stopping one hour at Manchester, must stop for thirty minutes both on the outward and homeward journies at the control at Birmingham. The distance from Hendon to the first control, Castle Bromwich Playing Fields, Birmingham, is 91 miles, and the distance thence to Manchester is 70 miles.

Competitors will leave the Hendon Aerodrome in the order of their handicap times, which order is indicated by their official numbers. The first is due to start at 8 a.m., and the winner is expected to cross the finishing line at Hendon at about 5 p.m.

Public enclosures have been erected at the Birmingham control, where the first pilot is expected to arrive from Hendon at about 9.30 a.m.

Enclosures have also been erected at Manchester at the Trafford Park Grounds, where the first arrival may be expected about 11 a.m., and the competitors will be arriving and departing at frequent intervals up to about 3.30 p.m. The time of arrival of each competitor will be taken at the moment of landing within the boundary of the control, and each competitor will be officially restarted from Manchester one hour after alighting, and at Birmingham thirty minutes after alighting.

The prize for the fastest time is the *Daily Mail* Gold Trophy and £400 presented by the Anglo-American Oil Co., (the Distributors of Pratt's Motor Spirit) in commemoration of the Anglo-American Peace Centenary. This Company has also presented the sum of £250 as first prize, and a further sum of £100 for a second prize in the handicap.

At Hendon, after the competitors have left, special exhibition and passenger flights will be made by the Hendon pilots, and in the afternoon a speed handicap will be flown for the "Oddinino" Trophy—presented by Mr. A. Oddinino; whilst at the Birmingham control Claude Grahame-White will give exhibition and passenger flights on the three-seater 80 h.p. Henry Farman biplane. The Anglo-American Oil Co. will have a large time board erected at this control on which the progress of the race will be displayed.

LONDON-MANCHESTER AND BACK AIR RACE, JUNE 20th. Particulars of Pilots and Machines.

Official No.	Pilot.		Machine.		Type.	Engine.
						h.p.
1	F. Bjorkland	Sw.	Blériot	F.	Monoplane	50 Gnome
2	W. Birchenough	B.	M. Farman	F.	Biplane ...	70 Renault
3	Pilot to be nominated		Grahame-White	B.	Biplane ...	50 Gnome
4	"		H. Farman	F.	Biplane ...	80 Le Rhone
5	P. Verrier	F.	H. Farman or	F.	—	80 Gnome
			M. Farman	F.	Biplane ...	70 Renault
6	L. A. Strange	B.	Blériot	F.	Monoplane	80 Gnome
7	J. Alcock	B.	M. Farman	F.	Biplane ...	100 Sunbeam
8	R. Carr	B.	Morane	B.	Monoplane	80 Gnome
9	W. L. Brock	U.S.	Morane	B.	Monoplane	80 Gnome
10	L. Noel	F.	Morane	B.	Monoplane	80 Gnome
11	R. R. Skene	B.	Martinsyde	B.	Monoplane	120 Austro-Daimler
12	Lord Carbery	B.	Bristol or	B.	Biplane ...	80 Le Rhone
			Morane	F.	Monoplane	80 Le Rhone
13	F. P. Raynham or another	B.	Avro	B.	Biplane ...	80 Gnome
14	H. G. Hawker	A.	Sopwith	B.	Biplane ...	100 Gnome

A. = Australian. B. = British. F. = French.
Sw. = Swedish. U.S. = United States.

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The London-Paris-London Air Race.

THE race from London to Paris and back in one day will take place, weather permitting, on Saturday, July 11th, and it is anticipated that in addition to several well-known Continental pilots, most of the pilots entered for to-morrow's race will also take part in this event. Entries, at £5 each, close on the 27th inst., and should be sent to the Royal Aero Club, 166, Piccadilly, W. Late entries at double fees will be accepted up to July 4th. The start of the race will be from the London Aerodrome, Hendon, the competitors leaving in the order of their respective handicap times, from 5 a.m. onwards. After leaving Hendon they will pass over Harrow, Epsom and the South Coast, and from thence across the Channel to Boulogne and then on to the Buc Aerodrome near Paris. The return journey will be *via* Folkestone, Epsom and Harrow, to Hendon. In passing over the places mentioned, the competitors will have to descend sufficiently low for their numbers to be easily distinguished by the observers. Competitors are required to make a compulsory stop of one hour at Buc Aerodrome, which time may be occupied by replenishments and such repairs as are permitted. Any time spent in the Aerodrome beyond the one hour allowed will count as flying time.

EDDIES.

Although the Aircraft Co., Ltd., have met with great success in building Maurice and Henry Farman biplanes under licence, they are too enterprising a firm to rest satisfied with building these machines, however excellent they are. In this connection they have secured the services of Mr. G. de Havilland, with a view to designing and constructing original machines. Mr. de Havilland, as our readers are, of course, aware, has been connected for several years with the Royal Aircraft Factory at Farnborough, where he has had long experience both in designing and piloting aeroplanes, and he is probably one of our cleverest scientific pilots at the present day. While at Farnborough Mr. de Havilland has had a great number of different machines, factory built as well as privately constructed, pass through his hands, so that he must have at his finger tips, as it were, the good and bad features of practically all the aeroplane types.

With a designer of such experience, a firm which maintains so high a standard of workmanship as does the Aircraft Co., should be in a position to produce something really startling. For the exact form which this "startler" may assume, I must for the present leave my readers to "wait and see."

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Marcus D. Manton, who has, it will be remembered, joined Mr. B. C. Hucks in giving exhibitions of looping the loop and other "scientific experiments," relates the following amusing incident: At the local cinema theatre of one of the towns where he had been giving exhibitions, a film was shown representing Manton doing a loop. Preceding the film a lantern slide portrait of Manton, taken at Hendon some time ago, before he was adorned with a moustache, was flashed on the screen. Following the film showing the looping was another portrait of him taken just after landing, showing him, of course, with the very decorative adornment of his upper lip which is now a source of great pride, sufficient to overcome objections to any possible increase in head resistance. One of the audience was heard to clamour loudly for information regarding the kind of "grower" used by Manton and which was capable of producing a moustache whilst he looped the loop.

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Talking about moustaches reminds me of another case in which, however, the procedure was reversed. An Austrian pilot is said to have shaved himself whilst flying at an altitude of about 6,000 ft. The report does not state whether he used a safety or an ordinary razor, but at any rate the pilot may be assumed to have had "a close shave."

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Mr. Pemberton-Billing tells me that Supermarine P.B.1 was taken out for a short test on the water the other day, but that owing to the propellers being unsuitable only a short hop was accomplished. P.B.1 has been altered from a single-screw tractor to a twin-screw propeller machine, as Mr. Pemberton-Billing is now concentrating on that type, and so wished to obtain some data which might be useful in designing the new P.B.7. I understand that two machines of the P.B.7 type are on order from Germany and are already in the course of construction. Briefly, P.B.7 will consist of two separate units—the boat, which is of more or less standard hydroplane type, and the wings and tail planes. The engine will be placed down in the hull of the boat and will drive, through a chain transmission, two propellers situated behind the main planes, and in addition a water propeller placed under the rear end of the boat. By means of guide release devices the wings and tail planes may be instantly detached from the boat, which is thus converted into a high-speed motor boat, driven in the ordinary way by means of the submerged propeller. Floats placed under the wing tips and under the inner ends of the lower main planes will keep these afloat, so that in a fairly smooth sea it should be possible to "back" the boat into the wings again, secure them in place and proceed as a waterplane. The experiment is a highly interesting one, and should furnish some valuable information, even if the first attempt should not be a perfect success.

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Mr. Louis Noel, who, it will be remembered, was the first man back in the Aerial Derby, but who was disqualified for not passing the last two controls, is to receive, as a consolation prize, from the distributors of "Shell" motor spirit, a solid silver model of his Morane-Saulnier monoplane. Last Saturday Noel received another consolation prize in the form of a miniature replica of the large cup presented by Mme. Manio and won by R. H. Carr.

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According to a report from Germany an aeroplane is said to have made a flight of a quarter of an hour's duration over Cologne on Sunday last with nobody on board. It appears that the engine was started before the pilot got into his seat, and the machine taking charge was flying about for fifteen minutes when the petrol supply gave out and the machine perforce had to return to the ground. The propellers were smashed in landing, but it is hoped that with a little more training the machine can be taught the intricacies of alighting like a good little machine should.

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This is not, however, the first instance of an aeroplane running away, for a couple of years ago a machine—a Blériot, I think—got away from a pupil at Hendon, and was only caught after quite an exciting chase. On another occasion Mr. Ewen's Dep. monoplane made a dash for liberty, but was forced to abandon the attempt, as Mr. Warren managed to get hold of a wing tip, and stopped the machine by swinging it round until it charged into the railings of one of the enclosures. Neither of these machines, however, had the nerve to take the air.

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Mr. W. R. Ding, who annexed great fame by flying across the Channel with Princess Ludwig of Löwenstein-Wertheim as a passenger on his Handley Page biplane a short time after obtaining his "ticket," has been giving some very successful exhibition flights at Bath. Among the numerous passengers carried, the first was Miss Ivy Ashman, the well-known Bath soprano, who took very kindly to the air. Besides exhibition flights, Mr. Ding gave demonstrations of bomb dropping, a hayrick serving as a target. Out of the four bombs dropped from an altitude of between 200 and 300 ft. the nearest was only 15 ft. away from the target, whilst the other three distances were 45, 50 and 58 ft. respectively. Considering the short experience he has had, Mr. Ding's handling of his machine is remarkably good, and the fact that he has so quickly mastered the control, is still further confirmation of the ease and handiness of the Handley Page biplane.

"Æolus."

CORRESPONDENCE.

Brakes for Aeroplanes.

[1870] I have read with considerable interest the letters in your correspondence pages on air and other brakes. It seems to me, however, that these methods of checking the speed of aeroplanes are wrong. Would not a better method be to reverse the engine, as is done with ships? This would make it quite safe to land on ground which would spell disaster at present. My opinion, as an engine builder, is that it would be quite easy to build a reversible engine. The opinion of your readers regarding the effect of reversing the engine on the stability of the aeroplane would be of interest.

Silsden, near Keighley. MECHANIC.

[1871] I shall be glad if you will permit me space to reply on the points and suggestions contained in Mr. Herman Shaw's letter appearing last week.

I do not think the events which your correspondent foresees are likely to occur at all, as, of course, the brakes would not be applied suddenly and violently, immediately the machine touched earth, but gradually, and with increased pressure as soon as the aeroplane had appreciably slackened speed; and for this reason I do not see that a sudden nose-dive, or any severe shock, would occur if the brakes were properly applied.

Touching Mr. Shaw's suggestion of air or wind brakes, these have been found to be of little or no use, as the braking effect is small even at high speeds, and when the machine is travelling comparatively slowly it is totally inefficient, and in the case of a following wind, it would actually increase the speed of the aeroplane. The braking effect of a skid is also very small, and has several other disadvantages.

In an interesting article which appeared in FLIGHT some time ago, Mr. de Havilland stated the disadvantages and comparative uselessness of any form of brake of the drag or skid type, and also of a wind or air brake.

The utility of a brake, such as the one which I referred to in my previous letter, will on consideration be quite apparent, and would not, as in the case of any form of drag-brake, or skid, cause the slightest damage to the surface of any ground, growing crops, &c., upon which the aeroplane should happen to alight; which, in the case of a sudden forced descent, would be a consideration.

Walthamstow. V. H. MAIR.

Turbine Blade Camber.

[1872] In FLIGHT of the last week in May, a correspondent gives a sketch of blade camber of a turbine blade. In case readers should compare it with aero-cambers, it would be as well to show the great difference between them.

Steam at a high pressure is not at all similar to air in its action on blades, and in a turbine the blade is not serving the same purpose as an aerofoil.

The blades in a Parsons are placed close together, and the steam in passing between them encounters a nozzle-shaped passage, so losing some pressure and gaining some velocity, as under:—

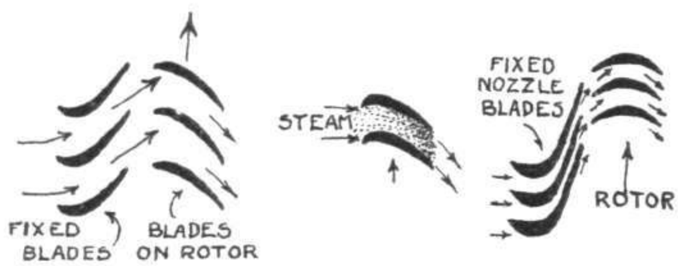

Fig. 1. Fig. 2. Fig. 3.

It may be seen (Fig. 1) that the impulse is both derived from the change of direction of the steam and *also* from its increase in velocity due to the "trailing edges" of the blades being closer together (at right angles to flow of steam) than are the entering edges.

So the blade is really in position, relative to the steam, as shown in Fig. 2.

Of course, this scheme, applied to an aeroplane, would give a considerable "drift" value—which in a turbine is utilised to balance the thrust of the propeller.

The blades of a purely "impulse" turbine are more analogous to an aeroplane, as the "gap" is a larger proportion of the "chord," and the former does not converge (Fig. 3). All the pressure is turned into velocity in the fixed nozzle blading.

H.M.S. *Shannon*, Second Cruiser Squadron. NOEL F. WHEELER, R.N.

A sharp rise by Mr. B. C. Hucks on his Blériot during his recent visit to Leicester for exhibition flying.

FOREIGN AIRCRAFT NEWS.

New World's Records by Garaix.

ON the Paul Schmitt biplane fitted with 160 h.p. Rhone motor and Integral propeller, Garaix on the 10th inst. at Chartres made new speed records up to 100 kiloms., for pilot and four passengers and up to 150 kiloms. for pilot and five passengers. The new records are as follows, and where there were records existing, they are given in brackets.

PILOT AND 4 PASSENGERS.

Speed.

kils.	m.	s.		h.	m.	s.
10	5	27⅖	(Busson	0	7	8)
20	11	0⅕	(Busson	0	14	0⅘)
30	16	32⅖	(Champel	0	21	53⅘)
40	22	1⅘	(Champel	0	29	13⅖)
50	27	32⅕	(Champel	0	37	31)
100	55	12⅕	(Champel	1	13	1⅕)

Greatest speed.

110·091 k.p.h. (Busson, 87·251 k.p.h.).

Time.

¼ hour 26·580 kils. (Champel, 20 kils.).

½ hour 53·141 kils. (Champel, 40 kils.).

1 hour 107·580 kils. (Champel, 84·343 kils.).

PILOT AND 5 PASSENGERS.

Speed.

	h.	m.	s.
10 kils.	0	5	32⅖
20 kils.	0	11	5⅖
30 kils.	0	16	39⅖
40 kils.	0	22	14
50 kils.	0	27	47⅖
100 kils.	0	56	20
150 kils.	1	24	11⅕

Greatest speed.

108·448 kils.

Time.

¼ hour 20 kils. ½ hour 50 kils. 1 hour 106·168 kils.

Distance.

150 kils.

Duration.

1 h. 24 m. 11⅕ secs. (Faller, 1 h. 10 m. 17 s.).

The passengers were MM. R. Poulain, A. Mathieu, J. Rouede, G. Chantreau, P. Wagner, their combined weight being 327·5 kilogs. The pilot weighed 87 kilogs. and there were also carried 140 kilogs. of fuel and 54 kilogs. of oil, so that the total load was 608 kilogs.

550 Kiloms. in Five Hours.

ON the 12th inst., Lieut. Quillien, on a Blériot Gnome, set out to fly from Epinal to Cherbourg on a military machine, but owing to a very thick fog he was obliged to land at Longues. He had, however, effected a non-stop flight of 550 kiloms. in five hours, flying for most of the time at a height of 2,000 metres.

Flying from Paris to Lausanne.

HAVING received orders to rejoin his regiment, a Swiss pupil at the Farman school at Etampes, on the 11th inst., determined to fly back to Switzerland. Accompanied by a friend on his H. Farman, he flew from Etampes to Basle, with a stop for lunch at Dijon, and the next day went on over the Alps to Lausanne.

Crotoy to Buc on a Caudron.

HAVING to carry out some tests before a military commission at Buc, Chanteloup on the 13th inst. flew on his Caudron from Crotoy to Issy and then across to Buc.

Buc-Verdun on a Farman.

ON his H. Farman biplane, Sergeant Chatelain, accompanied by his mechanic, on the 12th inst. flew from Buc to rejoin his centre at Verdun. He had to fly against a very strong wind so that the trip took 4 hrs. 10 mins. including a stop at Perthuis (Marne) for replenishments.

The Gordon-Bennett Meeting.

THE main lines of the programme for the Gordon-Bennett Meeting at Buc have now been arranged as follows: September 19th, Qualifying Events for French Eliminating Trials. September 20th, French Eliminating Trials in morning, other events in afternoon. September 26th, Qualifying Speed Tests for the Cup Competition. September 27th, Race for the Gordon Bennett Cup in the morning, and other events in the afternoon.

R.E.P. again President of Chamber.

AT the Annual General Meeting of the Chambre Syndicale des Industries Aeronautiques last week, M. R. Esnault-Pelterie was re-elected President, while MM. Henry Kapferer, Alfred Leblanc and Leon Morane were elected Vice-Presidents with Mr. A. Groupy as Treasurer. M. Andre Granet was also re-appointed General Secretary.

The Stability Competition.

SOME tests in connection with *Concours de la Securité en aeroplane* were made at Buc on the 11th inst. The competitors were required (1) to make a right-hand turn and land with motor stopped, and (2) make a left-hand turn, slacken speed and accelerate without touching the ground. The tests were accomplished by Molla on a R.E.P. "parasol," Capt. Eteve on a M. Farman fitted with his stabiliser, Lumiere on a Monge "parasol." Others taking part were Mr. Watson, Durafour on a Deperdussin fitted with the de la Celle control, and a Balassanian monoplane. The Moreau "aerostable" was also demonstrated. Pelletier and Le Bourhis were seriously injured when testing parachutes for use on aeroplanes.

Sunday at Juvisy.

ALTHOUGH there were no actual competitions some remarkable flying was seen at Juvisy on Sunday afternoon as will be realised when it is mentioned that those who were up included: Pequet (Morane), Pourpe (Deperdussin), Audemars (Morane), Chevilliard (Farman), Bill (Farman), Espanet (Nieuport), Gaubert (Aviatik), Brindejonc des Moulinais (Morane), Garros (Morane), Gilbert (Morane), Molla (R.E.P.), Prevost (Deperdussin), Rose (Morane), Baudry (Morane), and also Champel on his big Anzani-engined biplane. Most of the pilots arrived by air during the morning, and returned by the same way to their headquarters in the evening.

Testing the Dorand Biplanes.

HAVING accomplished the first stage, from Villacoublay to Rheims, of the long test flight, on the 8th inst., the escadrille of six Dorand-Anzani armoured machines went on to Verdun, *via* Sedan, on the following day, while on the 10th a trip of 460 kiloms. took the machines back to Villacoublay by way of Troyes, Chalons Camp, and Romilly. On Monday last the second part of the test was commenced with a flight from Villacoublay to Dijon and Chatillon.

1,000 Kiloms. in a Day.

A BUSY day was spent by Adjudant Quennehen on Friday last when, in out and home trips from Epinal he covered more than 1,000 kiloms., being accompanied throughout by an observer. The trips from Epinal included to Chaumont and back, to Chalons-sur-Saone *via* Nancy and back by Jussey, to Dayon and back, to Nancy and back and a circuit *via* Dayon and Vittel.

Fatal Accident to Major Felix.

IT is with the greatest regret that we have to record the death of Major Felix, which occurred as the result of an accident at Chartres on Wednesday when testing a new machine designed by a Polish engineer. It will be recalled that Major Felix did some fine flying on the Dunne machine, including a trip from England to France.

French Military Fatality.

WHILE a military biplane, piloted by Brigadier Blot, was manœuvring above a wood close to Toul on the 13th inst., the machine side-slipped, and then dived to the ground; the pilot was killed on the spot, and the passenger, Sapper Cheveau, was so seriously injured that he died on Sunday.

A Mishap to Pegoud.

WHILE making a trial flight at Warsaw on the 9th inst., Pegoud's machine was upset by a sudden gust of wind. It fell among some trees, and the pilot fortunately escaped serious injury, being caught by the branches.

Capt. Amundsen a Pilot.

AT the Gardermoen military flying ground near Christiania, on the 11th inst., Capt. Amundsen, the well-known Arctic explorer, qualified on a Farman biplane for a pilot's certificate. Just previous to making the tests Capt. Amundsen was making a flight with Capt. Sem Jacobsen, when the machine dashed to the ground and was smashed. According to one account the motor failed, while another says that the elevator broke; fortunately pilot and passenger escaped with a shaking.

Guillaux in Australia.

ON the 9th inst., Guillaux, on his Blériot-Gnome, flew rom Bendigo to Ballarat, a distance of 80 miles in 55 mins. During the trip the machine attained a height of 4,864 metres.

Eight-Hour Trip by "Z7."

DURING the evening of the 11th inst. the military airship "Z7" started from Frankfort and cruised to Wurzburg and back, being in the air for eight hours.

Another Zeppelin Wrecked.

DURING a voyage from Cologne, which it had been intended should end at Metz, the military airship "Z I" was wrecked at Diedenhofen, close to the French frontier. The airship was caught in a storm, and after losing a good deal of gas, the envelope became soaked with rain and the pilot decided to land. This manœuvre was rendered more difficult by the wind, and one gust caught the stern of the vessel and forced it to the ground, with the result that the main frame was broken. Troops were soon at hand and secured the airship, which was dismantled as quickly as possible. Fortunately no one was injured.

THE FLYING MACHINE FROM AN ENGINEERING STANDPOINT.

By FREDERICK WILLIAM LANCHESTER, M.Inst.C.E.

(*Continued from page* 635.)

We may now proceed to consider the interrelation and compatibility of engine and propeller. It has already been pointed out that in order to get the full output from a given engine (as is also well known to be the case in marine propulsion), a propeller pitch has often to be selected far from that proper to highest efficiency. The difficulty has (as in the early Wright machine) been met by adopting a reduction gear; alternatively (as also in the Wright machine) a multiplicity of propellers may be employed. It is evident, for example, that, if four propellers be used in place of one propeller, the individual diameter may be halved, and consequently for a given pitch (and therefore revolution speed) the pitch diameter ratio doubled. The original Wright machine furnished a good example of a case in which the propeller pitch diameter ratio

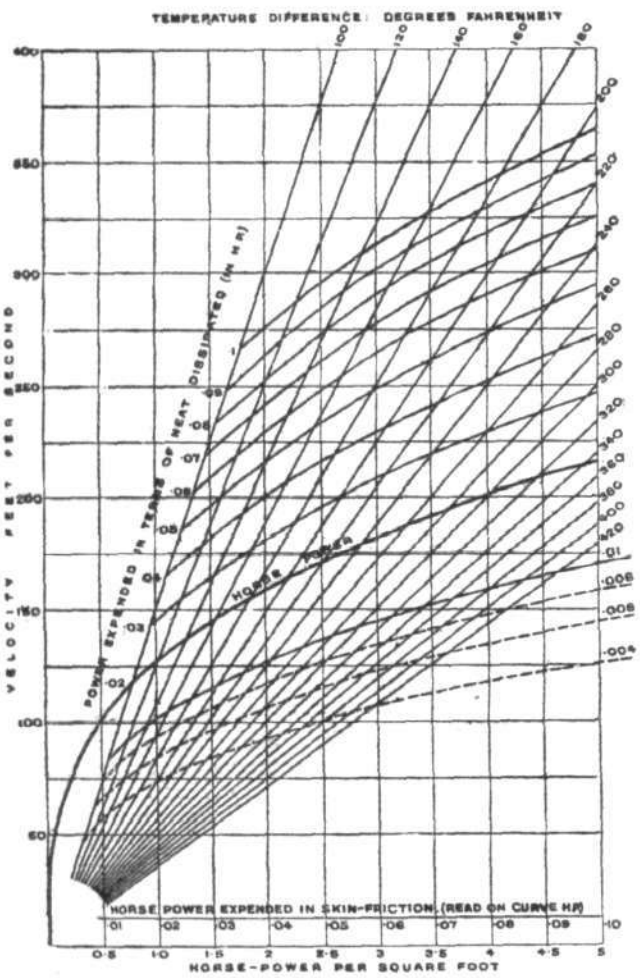

Fig. 28.

was made approximately that of best efficiency, and this result was obtained, in spite of the low velocity of the Wright machine, by a combination of both methods: that is to say, two propellers were used instead of one, and these propellers were geared down from the engine in the relation 10 to 33.

The incompatibility at present existing between the engine speed and the propeller pitch becomes less as the flight velocity is increased, so that, in the case of an ordinary machine of about 1,400 lbs. total weight, the propeller speed (for best efficiency) for a single screw machine becomes appropriate to the normal engine speed at about 100 miles per hour. Since the loss of efficiency for a fine pitch propeller, even down to half the pitch ratio of best efficiency, is not great, it may be taken that for flight speeds of 50 miles an hour upwards the balance of advantage lies definitely with the direct-coupled propeller; this agrees with experience. A point of interest in connection with propellers of comparatively fine pitch and somewhat reduced diameter, such as commonly in use to-day, is the fact that, with the engine opened fully out, there is very little difference between the thrust and the revolution speed whether the machine is standing or is in full flight—it is commonly reported that the revolution speed does not increase more than 10 per cent. from "standing" to full normal flight speed—the thrust variation also is slight. This fact constitutes the only justification for the static test of aeronautical propellers, frequently resorted to when approximate data are required. There is no doubt that in a propeller of theoretically perfect proportion, or in an existing propeller, if fitted to a machine of less resistance, there would be a far greater response to flight speed variations. Actually this is the case in marine propulsion where the propeller revolution recorder is commonly found to give more reliable readings than the ship's log.

8. *Relating to the Design of the Aerofoil.*—We shall now proceed to the discussion of the more detailed arrangements and structural features of the machine. First, the aerofoil. The pressure appropriate to least resistance we have already seen to be given by the expression $0{\cdot}32\ \rho V^2$ in abs. units, or $\frac{\rho V^2}{100}$ in lbs. per square foot. (Compare Figs. 17 and 18 and text. The constant $0{\cdot}32$ is empirical.)

Consequently if w is the weight (in flying order) the area required is $\frac{100\,w}{\rho V^2}$ as appropriate to least resistance.

The above is the whole basis of any initial "lay out"; there are many refinements, however, to be considered which enter into the complete problem; the principal of these are:—

The fact that part of w is a function of the aerofoil area—the quantity we are determining—means that the best area will be less than given by the foregoing expression. This point has been dealt with by me in *Aerial Flight*, 1907, vol. i, §§ 171, 194, 195, 196; also more recently by the staff of the N.P.L. (*See* Report of the Advisory Committee, 1911-12, p. 78).

Beyond the above the specification of flight velocity for any machine consists more often than not in the prescription of higher and lower limits rather than of a set fixed speed. Under these circumstances the final values and proportions are based on a lay out of graphs of resistances, thrust, &c., on the lines of the diagrams already given, Figs. 11 and 12.

It is evident from the general character of the resistance velocity curve as shown diagrammatically in Figs. 11 and 12, that whereas considerable departure may be permitted from the normal velocity of flight on either side of the minimum without incurring appreciable increase in resistance, at the limits of the flight speed range, the slope of the resistance curve is considerable, and there will

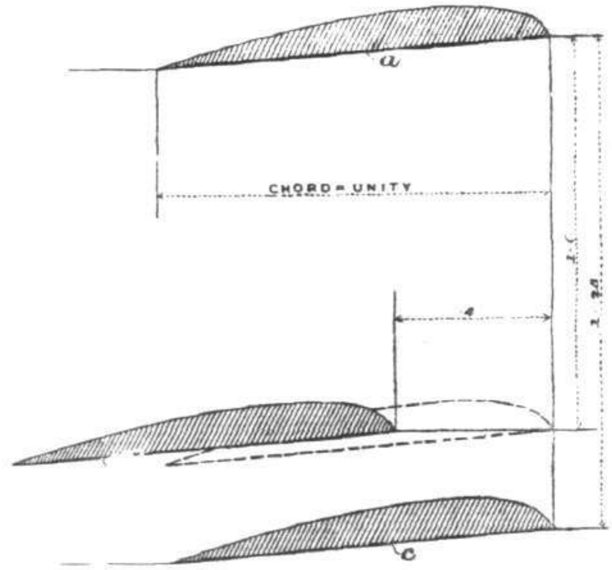

Fig. 29.

be sharply defined points at which the resistance is equal to the maximum propeller thrust and no liberties can be taken. It is important to note that at the maximum limit of flight speed the equilibrium of thrust and resistance is stable, whereas at the minimum limit the conditions are those of instability, so that should the machine at any time fall below the minimum, the aeronaut can only recover his power of flight by calling upon gravity to assist him, that is to say, by taking a downward course. If, as when near to the ground (or an obstacle), the downward course is not permissible,

the machine will execute an undignified descent, to which the verb "to pancake" has been applied. The critical speed at which this will take place is not necessarily related to the critical "least velocity" angle of the aerofoil.

Briefly, for a given machine the extent of the flight speed variation is a function of the reserve of thrust over the minimum resistance value, the absolute value of the limits being fixed by the load that the aerofoil is called upon to sustain. In the case of a high-powered machine, however, the lower limit may be prescribed by the critical angle of the aerofoil.

The choice between monoplane and biplane is, in the main, a question of constructional engineering; there is not a great deal to choose between the two from an aerodynamic standpoint, but with equally good design the monoplane gives a slightly better lift/drift ratio. The interference effect of the two members of a biplane aerofoil has been studied by many investigators. Langley showed, about 1890, that with superposed planes (aspect-ratio = 4) the interference was not serious when separated by a distance equal to their lesser dimension. The results of a more recent investigation by the staff of the N.P.L. are published in the report of the Advisory Committee for the year 1911-12 (p. 73), from which Table VIII has been taken. In addition to obtaining quantitative data for the particular aerofoil chosen (Blériot, aspect-ratio = 4), an investigation was also

TABLE VIII.—*Table of Multiplying Factors to Obtain Coefficients from the Coefficients for a Single Aerofoil.*

Biplane Spacing.	Lift Coefficient.			Lift/Drift.		
Gap/Chord.	6°.	8°.	10°.	6°.	8°.	10°.
0·4	0·61	0·62	0·63	0·75	0·81	0·84
0·8	0·76	0·77	0·78	0·79	0·82	0·86
1·0	0·81	0·82	0·82	0·81	0·84	0·87
1·2	0·86	0·86	0·87	0·84	0·85	0·88
1·6	0·89	0·89	0·90	0·88	0·89	0·91

made on the effect of staggering the planes. It is shown to be advantageous to arrange the upper foil in advance of the lower; thus the combination *a b*, Fig. 29, is of the same efficiency as the combination *a c*.

Considering the aerofoil, whether monoplane or biplane, from a structural standpoint, and in investigating the strength of the aerofoil as a whole, it may be treated definitely as an inverted cantilever system. Thus, comparing the stresses in an aeroplane to the stresses in a cantilever bridge, we have the weight of the *fuselage* with its alighting chassis, motor, passengers, &c., the inverted equivalent of the supporting reaction on the central pier of a cantilever girder. We have the air-pressure force, by which the said load is sustained, distributed along the aerofoil length corresponding to the weights of the outstanding members of the cantilever. We have a variation of pressure from point to point due to gusts, eddies, &c., corresponding to some degree to the movable loads representing traffic over the bridge. In the case of the aerofoil, we have in addition something not represented in the analogy of the cantilever girder, *i.e.*, the weight of the aerofoil itself directly supported by the pressure reaction; we may, however, regard this equal and opposite distribution of weight and pressure as superposed on the main system, and as not contributing to the stresses in the aerofoil members. So far as the analogy to the bridge holds good, it is evident we have a well-known engineering problem which is capable of being treated by well-known methods. In the calculation of stresses of the aerofoil members two alternative methods are in current use; in the one the aerofoil struts are treated as pin-jointed members, by the usual truss-girder construction; according to the other method, in place of the hypothesis of the pin-joint, we have the hypothesis of continuity in the main longitudinals. The first and simpler method has been used by several firms for many years past, and gives results which under ordinary conditions, are very much on the safe side; the second method has been developed during the last few years by the N.P.L. (*see* Report of the Advisory Committee, 1912-13, No. 83,) and has been adopted by the R.A.F., and more recently by other manufacturers.

On the pin-joint hypothesis the stresses are solved by the well-known graphic stress diagram; the alternative method is considerably more complex; reference should be made to the report cited. It is well to remark that though the pin-joint hypothesis gives results usually on the safe side, the extent of the factor of safety so introduced is not one that can be relied upon, and may in special cases be even negative. It is hardly necessary to point out that the more important and vital the problem, the less appropriate become methods of an approximate and inexact character.

9. *Resistance of Struts, Wires, Wheels, &c.*—The question of the resistance of components such as are commonly embodied in the design of existing machines has been studied experimentally at the N.P.L., at the Aerodynamic Laboratory at Gottingen, and by Mr. F. Eiffel, in Paris. A few results relating to strut sections are given in Fig. 30*a*. The graph *a a* is a plotting from N.P.L. data (*see* Report of Advisory Committee, 1912-13, p. 111), relating to the sections *a*, representing one of the best forms tested, graphs *b* and *c* relating to sections *b* and *c* as determined by Mr. Eiffel (*see Resistance of the Air and Aviation*, p. 184). In Fig. 30*a* ordinates represent resistance coefficient in absolute units, also in terms of normal plane (the normal plane unit being that of maximum section). In Fig. 30*b* are given two strut sections designed at the R.A.F. These were reported upon by the N.P.L. as giving less resistance *for given strength* than a number of others submitted. Approximately, strength for strength, these sections gave one-fourth the resistance of struts of circular form. (*See* Report of the Advisory Committee, 1911-12, p. 96.)

The resistance of wires and ropes has been investigated both

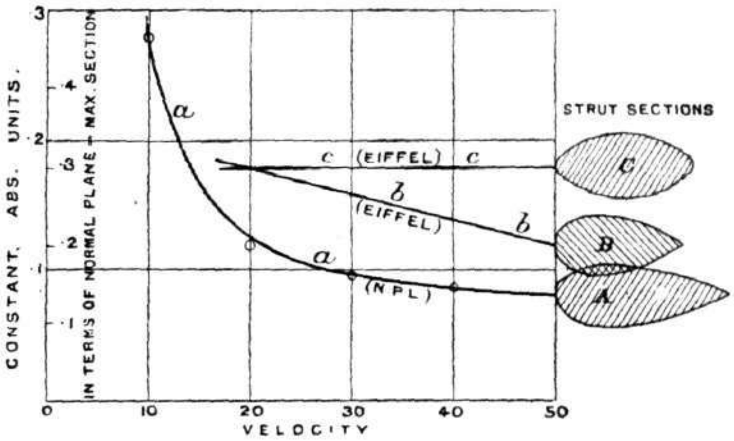

Fig. 30a.

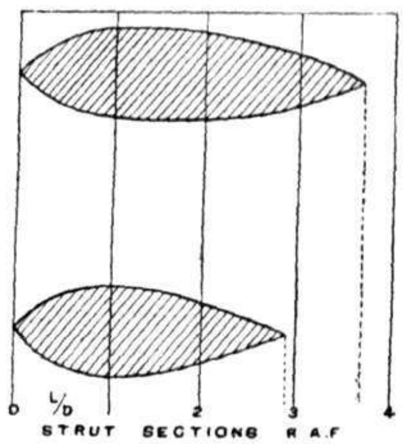

Fig. 30b.

by the N.P.L. and by Prof. Prandtl of Gottingen; the position may here be summarised by saying that the resistance of a rope or stranded cable, at right angles to the direction of motion, is virtually equal to that of its projected area in normal plane. The resistance of smooth wires is about 20 per cent. less. Both these results only hold good above a certain minimum value of lV, which may be taken at about 1·5; thus at 100 ft. per second, the rule may be taken as applying to cables or wires down to about $\frac{3}{16}$ths inch (=0·015 ft.) diameter. (Compare Memoranda 40 and 75, Reports of the Advisory Committee.)

Another interesting set of determinations, for which we are indebted to the N.P.L., is that relating to the resistance of alighting wheels; these have been tested both in respect of resistance and lateral reaction. (*See* Memorandum 74, Report of the Advisory Committee, 1912-13.) The direct resistance of a 26-inch wheel fitted with $2\frac{1}{2}$-inch pneumatic tyres appears to be equal to about a third of its projected area in terms of equivalent normal plane, the projected area being taken to be that of the tyre itself. For fuller information reference should be made to the Memorandum cited.

(*To be continued.*)

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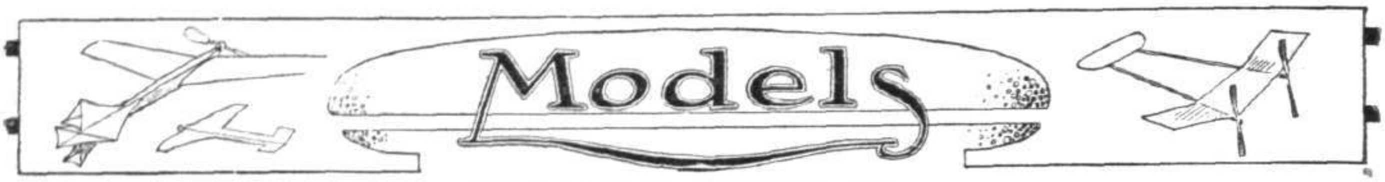
The Vienna Meeting.

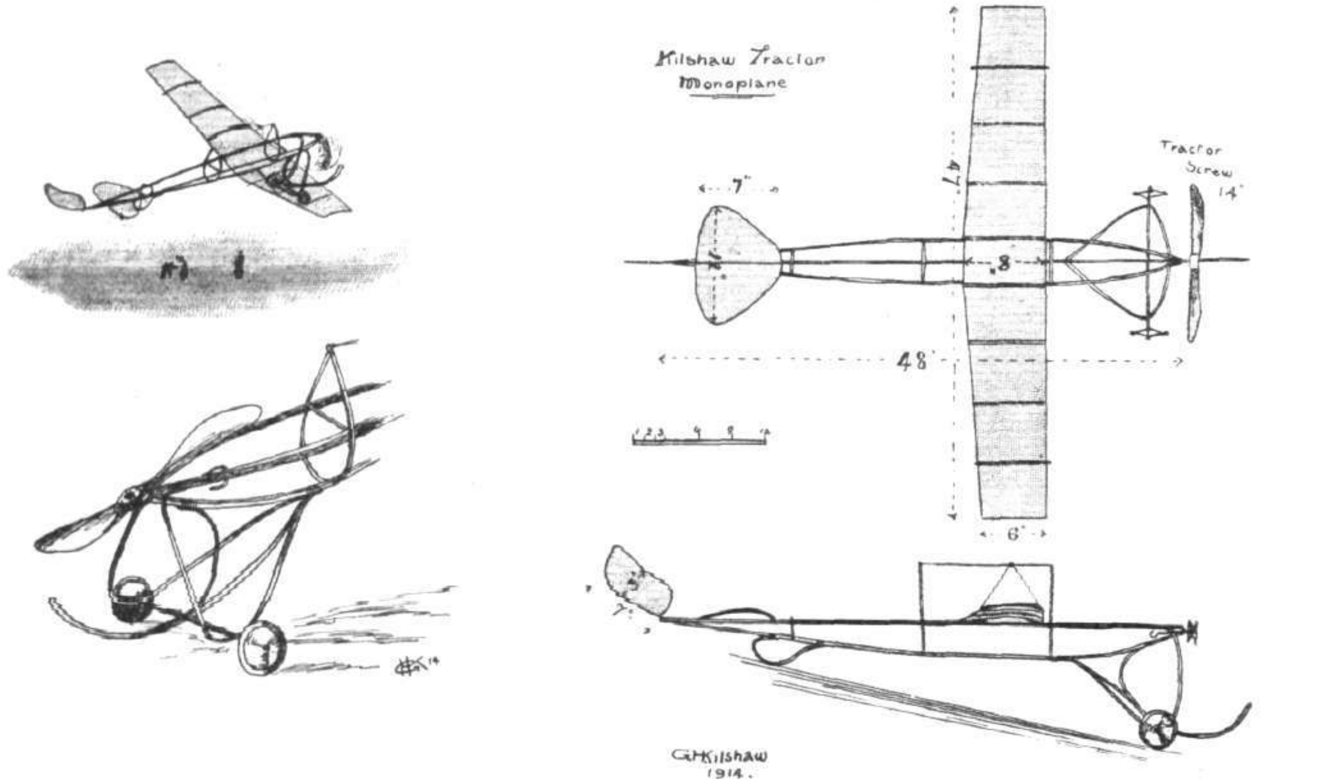
FOR the flying week at Vienna, which opens on Sunday, 21st inst., 33 entries have been received. Among them is one from Great Britain—a Bristol—12 from France, 1 from Russia, 8 from Germany, 1 from Hungary, and 10 from Austria, including one lady, Lilly Stein Schneider.



. Edited by V. E. JOHNSON, M.A.

Mr. G. H. Kilshaw's Tractor.

"JUST a word," writes Mr. Kilshaw, "to let you know how much I appreciate your good aims and efforts in FLIGHT model section, in pushing forward the advanced model and its ultimate uses. I send you with this some scale drawings, &c., of a large tractor r.o.g. monoplane I had out on February 28th.



Mr. G. H. Kilshaw's tractor monoplane.

"On her first run she sped along about 10 ft. and then pivotted round on the ground, on her left wing-tip. Adjustment of the rudder, however, put her right, and the model then did about four hops on the next attempt. On her fourth, after being given a little more lift on the front, she rose gracefully and continued flying for about ten seconds, head to wind, but on gradually turning down-wind nose-dived, breaking the tractor screw and damaging the front skid.

"However, I had her out on March 7th, and although the wind must have been blowing at about 20 miles per hour at times, I managed to secure a few short flights, these only being attempted on account of the risk of breakage, and even on these the machine was buffeted to the ground and then off again, but without any damage. At times the model appeared to be hovering quite stationary in the air and was decidedly pretty to watch.

"I shall now, however, put the machine aside for a short time until rough winds abate, when I expect some good sport.

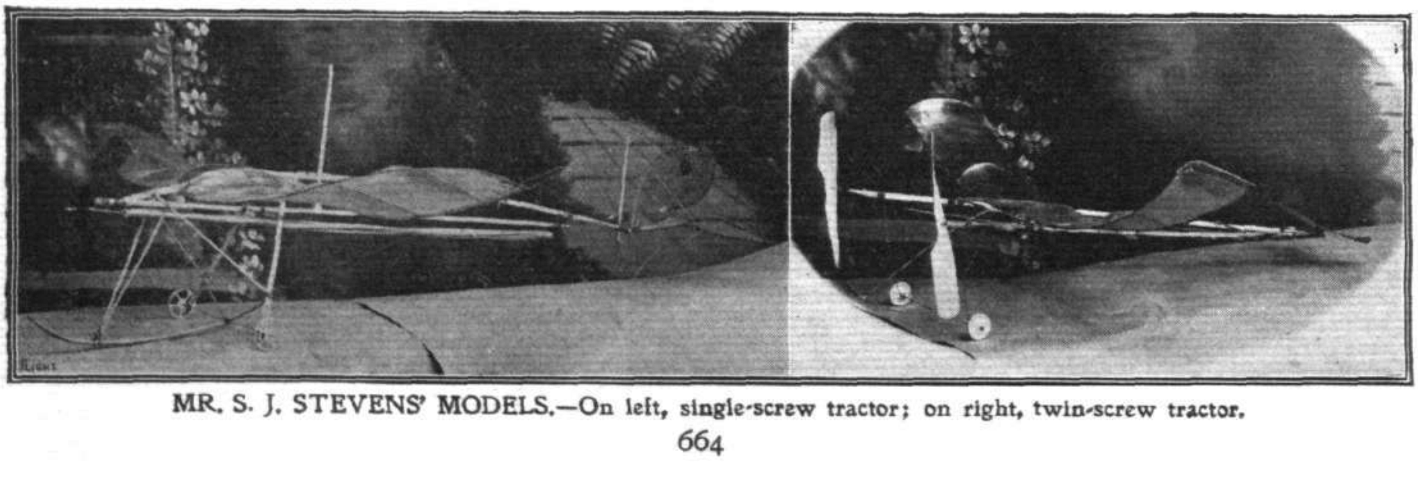
"The dimensions of the model are: Span, 47 ins.; average chord, 7 ins.; *fuselage* length, 48 ins.; tractor screw, 14 ins. diam., 18 ins. pitch; tail, 11 ins. by 7 ins.; fin, 7 ins. by 4 ins.; wheels, 3½ in. discs, divided axles, pivoted in the centre, and rubber-sprung near wheels.

"The encouraging results of above have led me to contemplate building one of my twin tail models about the same size, with, I hope, as good results."

We trust that our correspondent will not fail to do as he contemplates, because we are perfectly certain that some results worth knowing would be learnt from the behaviour of such a model.

Mr. S. J. Stevens' Tractor Models.

"ENCLOSED please find," writes our correspondent, "photographs of a single-screw tractor monoplane weighing 8¾ ozs., and a 4-oz.



MR. S. J. STEVENS' MODELS.—On left, single-screw tractor; on right, twin-screw tractor.

twin tractor. The single-screw tractor has only so far had some half dozen trials, but I have had flights of 100 yards off the ground; the model flies steadily and lands well, even in a short flight it glides right out flat, without any tendency to nose dive, thus landing on its wheels. I am expecting much better flights when the model is tuned up more. The motive power is a dozen strands of $\frac{1}{4}$ in. by $\frac{1}{32}$ in. Duree rubber. The twin-screw tractor is capable of rising from the ground and flying well for about 400 yards. I first tried the model with a straight plane, but it was a failure. I next tried it upturned, and obtained a fairly good flight. I then made the angle much greater, as shown in the photograph, with the result that the model gets up quickly and flies well. The motive power is two skeins of 6 strands of $\frac{1}{4}$ in. by $\frac{1}{32}$ in. Duree rubber. I thought these photos might interest some readers of FLIGHT. Many thanks for assistance obtained through it."

The Use of Models in the Development of the Aeroplane.*

By V. E. JOHNSON, M.A.

The Three Periods.

The subject is one which naturally divides itself into three distinct periods :—

(1) That of the early modellists, such as Stringfellow, Henson, Wenham, Penaud, Tatin, Hargrave, Langley, &c., *i.e.*, the past.

(2) The near past and the present, including the model experiments of Lanchester, J. W. K. Clarke, Roe, Dunne, Handley Page, &c. Experiments carried out at the National Physical Laboratory and similar places abroad. Experiments which have been made at the East London and other Technical Colleges, and lastly the experiments of model aeroplane clubs and private individuals.

(3) The work of the future. The past, as stated in number one, refers entirely to experiments made prior to the coming of the successful full-sized machine. Number two refers to some experiments that were made before that date, but generally to experiments that have been made since.

Now what part have 1 and 2 played in the development of the full-sized machine as we see it to-day? There are those who contend that the part which they have played is, comparatively speaking, but a small one, and trace the practical development of successful flying from Lilienthal, Pilcher, Chanute and the brothers Wright. Whereas I would not for a moment underrate *their* work, it is very certain that earlier model work, to say nothing of the work of Philips, Maxim, &c., *rendered their experiments possible.* When Langley's steam-driven model flew for a distance of some three-quarters of a mile over the Potomac, he considered that he had demonstrated the *possibility* of flight, and events since then have most certainly proved that he was right.

Prior to this, as long ago as 1809, the English scientist, Sir George Cayley, made a most profound study of flight, and forecasted practically all the chief features of flying as we know it to-day. In 1874, Penaud (the first to use rubber as a motive power on model aeroplanes) brought Cayley's researches to the notice of the *Soc. Française de Navigation Aerienne* in France, and himself considerably added to the principles and laws laid down in Cayley's work. In fact, so far did Penaud go, that if the principles which he enunciated could have been fully and correctly grasped by a practical engineer provided with the petrol motor as we have it to-day, there is no theoretical reason that I know of why we should not have been flying as long ago as 1874.

The Aim of Early Experimenters.

Before the advent of the full-sized machine many, perhaps most, of the flying models were first built with a view to discovering the amount of power necessary to sustain certain known weights in the air. The earlier models were not successful owing mainly to the inefficiency of their motors; when these were improved a definite step forward was accomplished. These earlier machines were found to be, as one would expect, very unstable, and then commenced a series of tests having for their aim the study of stability. These experiments were not confined to models, however, but were made with man-carrying gliders as well, to which reference has already been made.

One reason why experiments with models were very largely given up was owing to the short duration of their flights. Professor Langley himself confesses that some 10 to 12 seconds was the *most* duration that he could get out of a rubber-driven model; and this was the real reason why he went to all the trouble and expense of constructing his famous power-driven machines.

The Value of Penaud's Work.

Had Penaud's experiments been only carried on and extended as the rubber-driven model has been extended since modern clubs came into existence, then there is little doubt that so far as our present aerodynamical knowledge of *principles* goes, our present knowledge would not be greatly decreased, supposing the full-sized machine still non-existent.

Part Played by Power-Driven Models.

I do not think it can be said that experiments which have been made with power-driven models have so far really added much to our knowledge.

All our present knowledge of principles could have been laid down without them. With respect to the future, however, the case is most probably very different.

The Real Factor in Successful Fight.

It must always be remembered that the real factor which gave us the successful flying machine when it did, had nothing directly to do with aeronautics at all. *It was the invention and successful development of the internal combustion motor which rendered flying possible.* Without that in vain were all the experiments of the aeromodellists; the lives of Lilienthal and Pilcher, the falls of Blériot, the enthusiasm of Santos Dumont or the carefully reasoned out experiments of the Wrights. In this, so far as I know, the model has played no part whatever. I may be wrong in this conclusion; I would willingly learn that such was the case.

The Part Played by the Model Prior to 1903.

Summing up the case of the model prior to the successful advent of the full-sized machine, we thus see that it did directly and also indirectly play a very important part in the development of the aeroplane. But not such an important part as it might have done, one reason undoubtedly being that designers of full-sized machines were somewhat dubious as to how far model experiments could be applied in full-size practice. Lack of sufficient data was one of the chief reasons; experiments wanted either confirming or disproving, as well as extending and discussing.

Model Work since 1903.

Passing on now to the second period, if we omit a certain number of experiments made, principally with gliders, by designers of full-sized machines for the main purpose of studying various problems in stability, we have the enormous number of experiments, thousands upon thousands, tens of thousands, perhaps, of experiments that have been made by aeromodellists all over the country chiefly during the past five years. What have all these experiments done with respect to the development of the aeroplane and hydro-aeroplane as we have them in this year of grace 1914?

To be brutally candid, so far as I can see, they have done, practically speaking, at present, nothing—nothing directly, that is. One cannot consider in such a paper as this, the effect say of a person who first of all becomes interested in aeronautics as an aeromodellist and afterwards becomes a pilot or a designer of full-sized machines, &c.

Why is this? The question is not such an easy one to answer as one might think. It is complicated owing to several causes, one of which appears to be the following :—

The Powered Model and the Glider.

I made mention that builders of full-sized machines experiment with models almost solely of the *glider* type. Now the models with which aeromodellists experiment are *powered* models. Now there are distinct and well marked differences in the results obtained with the two types. The glider is the simpler but less advanced type, and is (at present) preferred by the theoretician and the full-sized builder; the powered model gives or should give, if the results are correctly interpreted, far truer and more valuable results. Just at present, however, the full-sized worker appears to view such results with some suspicion, and the aeromodellist looks on gliders as more or less beneath his notice. Probably both views are wrong. Again, the development of the full-sized machine, *up to the present*, has been so rapid—so rapid, *i.e.*, inasmuch as records, &c., are concerned—that the full-sized worker has had no leisure to seriously consider the simultaneous development of the model which has gone on side by side.

Full-Sized Designers and Model Workers.

Signs are, however, not wanting that the development of the present type of machine has in some respects reached the limit of efficiency in several respects. If this be so, then undoubtedly designers will once again deign to consider the humble model, provided, of course, it exists in other types than those of full-sized machines which have been already developed. Supposing that the assumption that any limit of efficiency has been reached or even nearly reached is wrong, then we may still find designers and builders of full-sized machines once again taking up the study of models with a view to develop still further existing types if it can be demonstrated to them that experiments with models can be successfully applied to full-sized work. This necessitates a further investigation of the laws of similitude which undoubtedly do exist between the two. Because it is not sufficient to show theoretically that model experiments *can* be so applied, it must also be shown *how* they can be applied.

* A paper read by Mr. R. M. Neilson (for the author) before the model section of the Scottish Aero. Society, March 18th, 1914.

The Importance of Data.

Now before we can have scientific laws, or indeed even general statements of any kind, we must have a large collection of *data*. The more the number of experiments, the more plentiful the data, the more likely is our law, which we will suppose to be deduced solely from experiment, to be correct, and the greater its value.

Results Must be Pooled.

But these data are valueless as a whole if different data are known to different individuals, and are not either shared in common or known to some individual, or body of individuals, possessed of the requisite scientific attainments, to sift the wheat from the chaff, the really valuable from that of lesser worth, and deduce from the most reliable data new generalizations which can be applied to the science of aviation as a whole, with a view, it may be, to specially advancing the efficiency of some particular part.

(*To be continued.*)

KITE AND MODEL AEROPLANE ASSOCIATION.

Official Notices.

British Model Records.

Single screw, hand-launched	Duration ...	D. Driver...	... 85 secs.
Twin screw, do.	Distance ...	R. Lucas ...	... 590 yards.
	Duration ...	G. Hayden	... 137 secs.
Single screw, rise off ground	Distance ...	W. E. Evans	... 290 yards.
	Duration ...	W. E. Evans	... 64 secs.
Twin screw, do.	Distance ...	L. H. Slatter	... 365 yards.
	Duration ...	J. E. Louch	... 2 mins. 40 secs.
Single-tractor screw, hand-launched	Distance ...	C. C. Dutton	... 266 yards
	Duration ...	J. E. Louch	... 91 secs.
Do., off-ground	Distance ...	C. C. Dutton	... 190 yards.
	Duration ...	J. E. Louch	... 94 secs.
Single screw hydro., off-water	Duration ...	L. H. Slatter	... 35 secs.
Single-tractor, do., do. ...	Duration ...	C. C. Dutton	... 29 secs.
Twin screw, do., do. ...	Duration ...	L. H. Slatter	... 60 secs.
Engine driven off grass ...	Duration ...	D. Stanger	... 51 secs.

Competitions.—On June 13th, the fourth annual competition for the *Model Engineer* Challenge Cup took place on Wimbledon Common in a gusty wind. This year the competition was altered, in regard to the average being taken of the three trials instead of the longest duration. Mr. H. G. Bond proved the winner with an average of $57\frac{1}{3}$ secs., who will hold the handsome trophy for one year (from annual prize distribution), and winning the *Model Engineer* silver medal which accompanies the cup; Mr. H. H. Bedford, of the Leytonstone Club winning the Association silver medal with $55\frac{2}{3}$, and Mr. J. E. Louch 3rd with $53\frac{2}{3}$ secs. taking the Association bronze medal. The following gives the results of the first competitors:—1. H. G. Bond, K. and M.A.A. and Leytonstone, average, $57\frac{1}{3}$ secs.; 2. H. H. Bedford, Leytonstone, $55\frac{2}{3}$; 3. J. E. Louch, K. and M.A.A. and Leytonstone, $53\frac{2}{3}$; 4. L. H. Slatter, K. and M.A.A. and Wimbledon, 35; 5. T. Kimpton, K. and M.A.A. and Leytonstone, $33\frac{1}{3}$; 6. A. F. Houlberg, K and M.A.A., 30; 7. W. A. Rogers, K. and M.A.A., $28\frac{1}{3}$; 8. D. A. Pavely, K. and M.A.A. and Croydon, 27. The longest duration was made by Mr. J. Louch in his third trial, viz., 112 secs. The model hon. sec., Mr. H. A. Lyche, was in charge of the meeting.

Official Trials.—These take place to-morrow on Wimbledon Common at 3 p.m. It must be clearly understood that no entries for trials can be accepted on the ground; all such entries must be received seven days prior to such trials.

Kite Competition.—The competition for prizes presented by Messrs. Brooke and Westhorp will be held to-morrow on Wmbledon Common at 3.30 p.m.

Model Competition.—Wanstead Flats, Leytonstone; station, Forest Gate, G.E. Ry.; for route see the Leytonstone Club notes to-day. Saturday, June 27th, at 3 o'clock; entries close June 20th. Longest flight competition for models, rising off ground under their own power (open to the world). Prizes, presented by Mr. A. W. Gamage: 1st, challenge cup and gold medal; 2nd, silver medal; 3rd, bronze medal. For rules see pages 5 and 6. Special rules Nos. 1, 2, and 3 in official programme. Additional rules governing this competition: 1. Competitors must be at the judges' flag at 3 p.m. sharp. Those not present at that time will be disqualified. 2. This competition will be decided on the longest flight and not on the average.

Inter-Team Competition for Models.—Open to affiliated clubs. For the Farrow Challenge Shield and Baden-Powell medals. All affiliated club secretaries should send in their application to the gen. hon. sec. at once, so that the secretaries can meet on 25th to draw for the first round, which will take place on July 4th.

27, Victory Road, Wimbledon. W. H. AKEHURST, Gen. Hon. Sec.

AFFILIATED MODEL CLUBS DIARY.

CLUB reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Bristol and West of England Aero Club (Model Section) (42, ROYAL YORK CRESCENT, CLIFTON, BRISTOL).

Notice to the London and Provincial Clubs.—Cheap day and half-day excursions are being arranged to the *Bristol International Exhibition* on the day of the Model Aeroplane Competition from Bath, Birmingham, Cheltenham, Gloucester, London, Penycraig, and other centres, and there will be steamboat sailings from Cardiff and South Wales. Full particulars of the excursions will be forwarded to the competitors on receipt of their entry forms. Programmes and entry forms may be obtained from the secretaries of the clubs in London and Birmingham, or by post on application to Mr. R. V. Tivy at the above address. All entry forms (or applications for entry forms) must be sent in not later than June 21st. *The acceptance of entry forms and fees from competitors not resident in Bristol or Bath will be conditional on the running of excursions from the various centres.* Full particulars of the events were published in FLIGHT on June 12th. The promoters of the competition trust that, in view of the special railway facilities, the model aero clubs in London and the West of England will co-operate with them by sending exhibits to Bristol (on or before July 11th), and by sending one or more representatives to fly them on Saturday, July 18th.

Leytonstone and District Aero Club (64, LEYSPRING ROAD).

JUNE 21ST, flying Wanstead Flats, 6.30 and 10.30 a.m. June 27th, 3 p.m., Gamage Cup Competition. Route—From Liverpool Street to Forest Gate; on leaving station follow tramlines to the left; Wanstead Flats will be reached in 3 or 4 minutes, and the competition will be held on the right hand side, about 5 minutes from the road.

UNAFFILIATED CLUBS.

Finsbury Park and District (66, ELFORT ROAD, HIGHBURY, N.).

JUNE 20TH, flying at Finsbury Park, 3 p.m.; r.o.g. duration contest, all types, at 5 p.m.

S. Eastern Model Ae.C. (1, RAILWAY APPROACH, BROCKLEY).

WEEK-END meetings on Woolwich Common and Blackheath at usual times.

The next Olympia Aero Show.

THE Aero Committee of the Society of Motor Manufacturers and Traders after an enquiry among aeroplane manufacturers, has recommended that the next exhibition of aeroplanes, &c., at Olympia should be held in 1916.

A Change of Address.

MESSRS. HEWLETT and BLONDEAU, Ltd., notify us that they are now moving their works and offices to Leagrave, and that after Saturday next all communications should be addressed to them at Omnia Works, Leagrave, Beds. Their telephone number will be 13 Leagrave, while the telegraphic address will be "Aeromnia, Leagrave.

Looping by Hall School Pupil.

IT will be recalled that Lieut. T. Gran, who looped the loop recently at the Blériot school at Buc, and who intends to attempt to fly from Scotland to Norway, was formerly a pupil at the Hall School at Hendon.

Mr. A. W. Schaef in England.

OUR readers will be interested to hear that Mr. A. W. Schaer, who has been experimenting with a monoplane of his own construction in New Zealand for some time, and who is the New Zealand agent for the General Aviation Contractors, Ltd., arrived in England on Wednesday. He proposes to visit the British aeroplane works, and then visit France and Germany for a similar purpose, subsequently returning to England with a view to securing his "ticket" at one of the British schools.

NEW COMPANIES REGISTERED.

Pneumosphere, Ltd., 18, Fleet Street, E.C.—Capital £30,000, in 28,500 pref. shares of £1 each and 30,000 ordinary shares of 1*s.* each. Manufacturers of and dealers in airships, aeroplanes, &c. First directors, L. Harris, H. Whitaker, W. E. Cobb, and L. J. Jones.

Shoreham Flying School, Ltd.—Capital £1,000, in £1 shares. Acquiring the flying school, &c., carried on by W. H. Elliott, G. L. Lusted, and B. H. England at the Shoreham Aerodrome, Shoreham, Sussex, as the Shoreham Flying School. First directors, W. H. Elliott, B. H. England, G. J. Lusted, and H. H. R. Aikman.

Aeronautical Patents Published.

Applied for in 1913.

Published June 11th, 1914.

11,676. H. FABRE. Hydroplanes.
11,757. H. W. J. E. GOLTSTEIN. Projectiles for shooting at airships, &c.
17,438. SOC. ANON. DES ETAB. NIEUPORT. Bodies of aerial machines.
20,110. SOC. DITE AEROPLANES MORANE-SAULNIER. Aerial machines.
21,196. AKT. GES. METZELER AND CO. Fabric for aircraft.

Published June 18th, 1914.

12,361. H. ZIEMSS. Aeroplanes.
12,436. A. D. WIGRAM. Hydro-aeroplanes.
18,930. W. E. THORN. Flying machines.

Applied for in 1914

Published June 18th, 1914.

1,678. JACOB LOHNER AND CO. Ground-brake for aeroplanes.
4,065. J. STASIAK. Aerial bomb-dropping apparatus.

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